

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

ROY COOPER GOVERNOR

JAMES H. TROGDON, III SECRETARY

February 7, 2018

ADDENDUM #2

To: Plan Holders

WI

From: Wes Jamison

Division 14 Project Manager

RE: Revisions: Plan Sheets: Roadway, Right of Way, and Signal;

Signal Special Provision Revisions, and 2'-6" Curb & Gutter

Ouantity

DN00563 Contract ID: County: Henderson

Letting Date: February 13, 2018

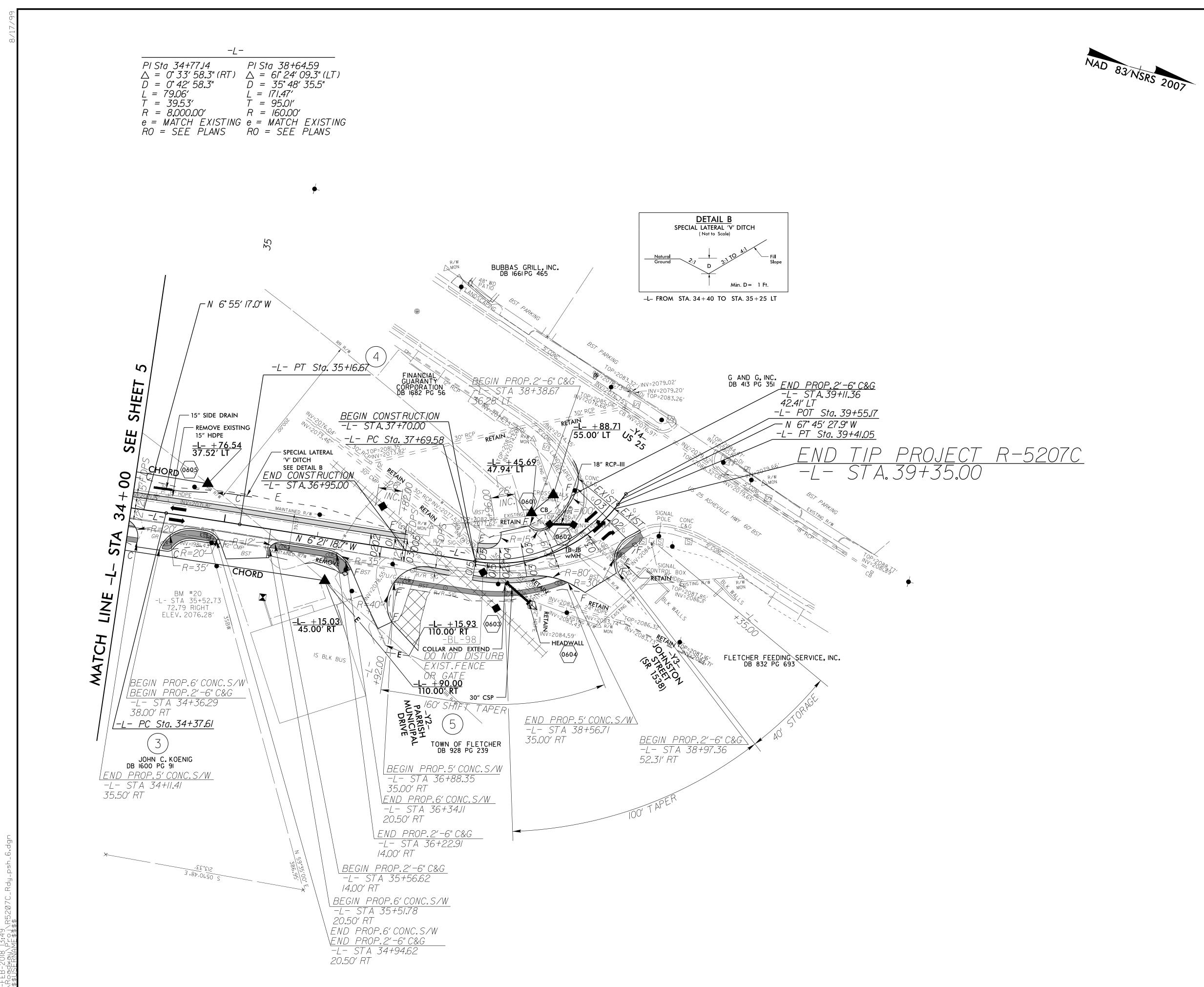
The above noted contract; has experienced the following changes:

- 1. Roadway Plan Sheet 6 has been revised; replace existing sheet with revised sheet.
- 2. Right of Way Plan Sheet RW-6 has been revised; replace existing sheet with revised sheet.
- 3. All Signal Plan Sheets (1-8) have been revised; replace existing sheets with revised sheets.
- 4. Signal Special Provisions have been revised; replace existing special provision pages with revised special provision pages TS-1 through TS-30.
- 5. 2'-6" Curb & Gutter Quantity has been revised, from 300 LF to 270 LF; replace the existing pages T-1 through T-6.

Please access ebs addenda files on Bid Express®.

Thank you for your attention to this matter.

Website: www.ncdot.gov



PROJECT REFERENCE NO.

ROADWAY DESIGN
ENGINEER

PROJECT REFERENCE NO.

RW SHEET NO.

ROADWAY DESIGN
ENGINEER

PROJECT REFERENCE NO.

RW SHEET NO.

ROADWAY DESIGN
ENGINEER

PROJECT REFERENCE NO.

SHEET NO.

PROJECT REFERENCE NO.

RW SHEET NO.

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RS&H

UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL

FOR -L- PROFILE SEE SHEET 8

PROJECT REFERENCE NO. R5207C Location and Surveys I, Brian Barwatt, a Professional Land Surveyor in the state of North Carolina hereby certify to the best of my knowledge and belief that the following work item(s) (Base map Compilation, Planimetrics, R/W Staking) performed under my responsible charge meet NCDOT Survey Standards as directed in the NCDOT Location & Surveys guidelines and procedures. Ifurther certify that the data compiled came from available surveys/mapping performed by others and provided to me by NCDOT and do not certify to the accuracy or quality of the individual data sources. Ifurther certify that the right of way and permanent easement points shown herein and outlined in the tables shown hereon (localized coordinates, station/offset) have been checked and are accurate representations of the right of way and permanent easement points depicted on the corresponding highway plans. Ialso certify that the right of way and permanent easement points shown herein have been field monumented under my supervision from existing survey controlprovided by others; that the depicted property data shown herein were surveyed by others; and these monuments denote the right of way and easement boundaries at the time of staking which may be subject to change due to right of way revisions (See deeds for final determination). Witness my original signature, registration number and sealthis 26th day of October, 2017. Brian Barwatt L-4727 ProfessionalLand Surveyor PLS # G AND G. INC. DB 413 PG 351 BEGIN CONSTRUCTION -L- POT Sta. 39+55,17 -L- STA.37+70.00 - N 67° 45′ 27.9" W <u>-L- +88.71</u> /55.00' LT -L- PT Sta. 39+41.05 -L- PC Sta. 37+69.58 END PROJECT -L- STA.39+35.00 END CONSTRUCTION \-L- STA. 36+95.00 MAINTAINED R/W 37+17.01 -29.46' <u>-BL-98</u> BLK BUS FLETCHER FEEDING SERVICE, INC.
DB 832 PG 693

RW-6

END TIP-**PROJECT** *R*–5207*C* HOWARD GAP ROAD VICINITY MAP N.T.S

MUNICIPAL

BEGIN TIP

PROJECT R-5207C

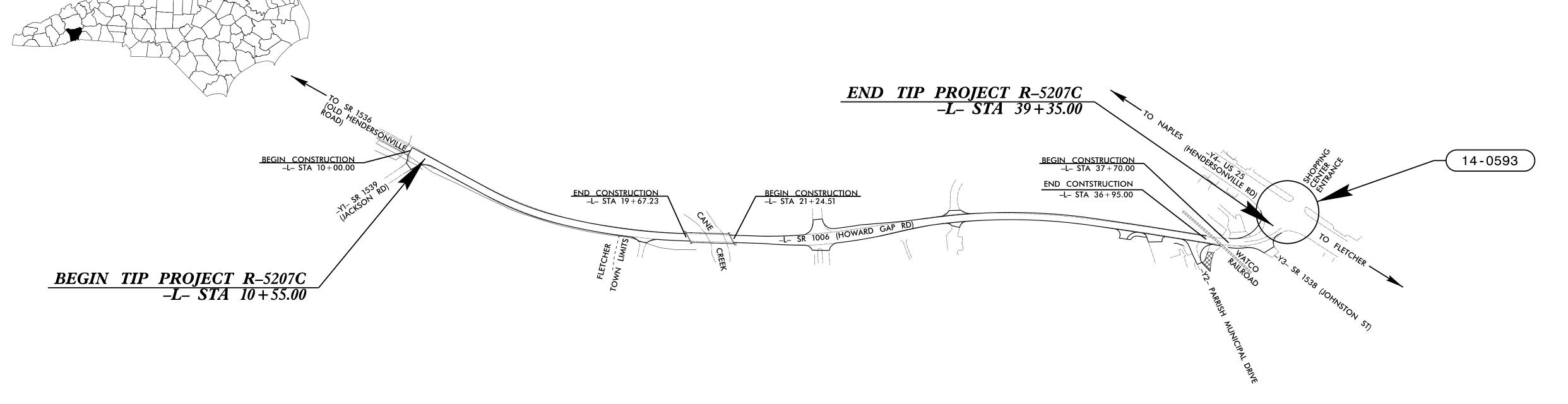
STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

Project No. Sheet No. *R*-5207*C* Sig. 1

HENDERSON COUNTY

LOCATION: US 25 (HENDERSONVILLE ROAD) AT SR 1006

(HOWARD GAP ROAD)/SHOPPING CENTER ENTRANCE TYPE OF WORK: GRADING, PAVING, DRAINAGE, SIGNALS, TRAFFIC CONTROL, SIGNING, PAVEMENT MARKING, AND EROSION CONTROL



DOCUMENT NOT CONSIDERED FINAL **UNLESS ALL SIGNATURES COMPLETED**

Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.

Prepared in the Office of:

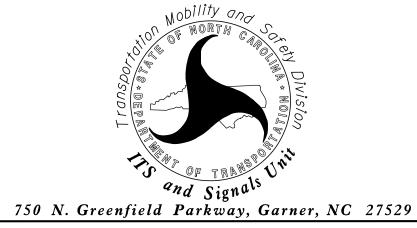
Sheet #	Reference #	Location/Description
$\overline{Sig. 1}$	<i>N/A</i>	Title Sheet
Sig. 2	N/A	Summary of Quantities
Sig. 3-6	14-0593	US 25 (Hendersonville Road) At SR 1006 (Howard Gap Road)/Shopping Center Entrance
Sig. 7-8	N/A	Revised Standard Drawings

Index of Plans

INTELLIGENT TRANSPORTATION AND SIGNALS UNIT Contacts:

Timothy J. Williams, PE - Western Region Signals Engineer D. Todd Joyce, PE - Signal Equipment Design Review Engineer





PROJECT REFERENCE NO.	SHEET	NO.
R-5207C	Sig	2

SIGNALS SUMMARY OF QUANTITIES **ESTIMATE**

ITEM DESCRIPTION	UNITS	QUANTITY
JUNCTION BOX	EA	1
LED BLANKOUT SIGNS	EA	1
CONTROLLERS WITH CABINET (2070E, 332 BASE MOUNTED)	EA	1
DETECTOR CARD	EA	8
SIGN FOR SIGNALS	EA	1
SIGNAL CABLE	LF	140
LEAD-IN CABLE (14-2)	LF	860
INDUCTIVE LOOP SAWCUT	LF	315
UNPAVED TRENCHING (1) (2")	LF	55
UNPAVED TRENCHING (2) (2")	LF	15
UNPAVED TRENCHING (1) (4")	LF	15
TYPE II PEDESTAL WITH FOUNDATION	EA	1
PEDESTRIAN SIGNAL HEADS	EA	1
CABINET BASE EXTENDER	EA	1

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED US 25 (Hendersonville Road)

SR 1006 (Howard Gap Road)/ Shopping Center Entrance
Division 14 Henderson County Flet

REVISIONS

750 N.Greenfield Pkwy,Garner,NC 27529

PLAN DATE: January 2018 REVIEWED BY: J.G. Townsend PREPARED BY: S.G. Haynie REVIEWED BY:

SIG. INVENTORY NO. 14-0593

Prepared in the Office of:

RS&H

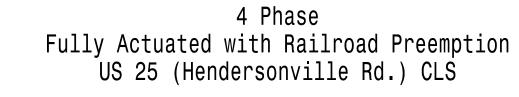
ARCHITECTS-ENGINEERS-PLANNERS, INC.

8521 SIX FORKS ROAD, SUITE 400

RALEIGH, NC 27615

(919) 926-4100

PROJECT REFERENCE NO. R-5207C Sig 3



NOTES

- 1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- 2. This location contains railroad preemption phasing. Do not program signal for late night flashing operation.
- 3. Phase 1 may be lagged.
- The order of phase 3 and phase 4 may be reversed.
- 5. Set all detector units to presence mode.
- 6. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- 7. Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- 8. See R-5207C pavement marking plans for new pavement markings.
- 9. Ensure flashing operation does not alter operation of blankout signs.

SR 1006 (Howard Gap Road),

Division 14 Henderson County

50 N.Greenfield Pkwy, Garner, NC 27529 PREPARED BY: S.G. Haynie REVIEWED BY:

Shopping Center Entrance

January 2018 | REVIEWED BY: J.G. Townsend

INIT. DATE

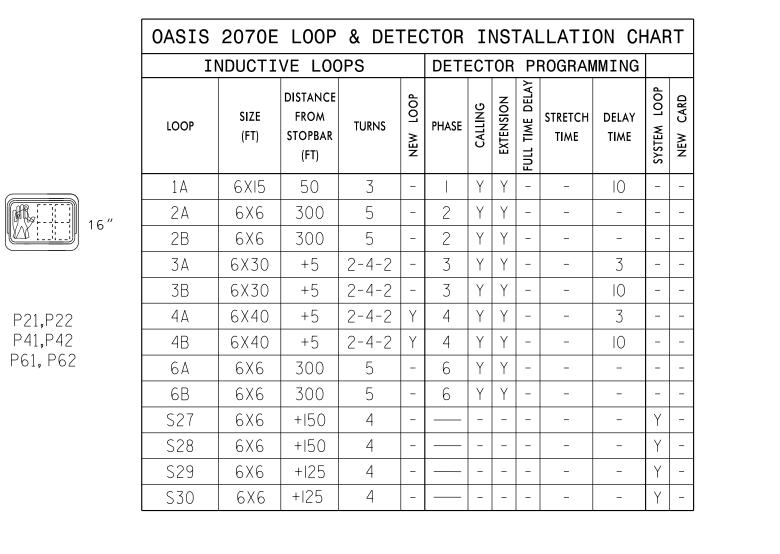
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Steven G. Haynie 1/31/2018

SIG. INVENTORY NO. 14-0593

— D633D© 109A510 44B6R.E

- 10. Program parent phases for Overlap "P" for all phases used in normal operation. 11. Maximum times shown in timing chart are for
- free-run operation only. Coordinated signal system timing values supersede these values.
- 12. Portions of crosswalk not shown for clarity.
- 13. Closed loop system data: controller asset #0593.



Prepared in the Office of:

RS&H

ARCHITECTS-ENGINEERS-PLANNERS, INC.
8521 SIX FORKS ROAD, SUITE 400
RALEIGH, NC 27615

(919) 926-4100

PHASING DIAGRAM DETECTION LEGEND

DETECTED MOVEMENT

3.0

MIN RECALL

YELLOW

ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and a

3.0

YELLOW

MIN RECALL

Ped Clear Before Pre

Red Clear Before Pre

Dwell Min Time

Omit Overlaps

Yellow Clear Before Pre

Enable Backup Protection

Ped Clear Through Yellow

* Time defaults to time used for phase during normal operation

0.0*

12

RAIL PREEMPT PHASES

PHASING DIAGRAM

TABLE OF OPERATION

21

22,23

41

42

P21, P22

P41,P42

P61, P62

PHASE

DW W DW DW DW W DF

| Dw | Dw | Dw | Dw | Dri

| W | W | DW | DW | DW | W | DR

* SEE NOTE 9

SIGN © OFFOFFOFFOFF ON ON *

SIGNAL FACE I.D.

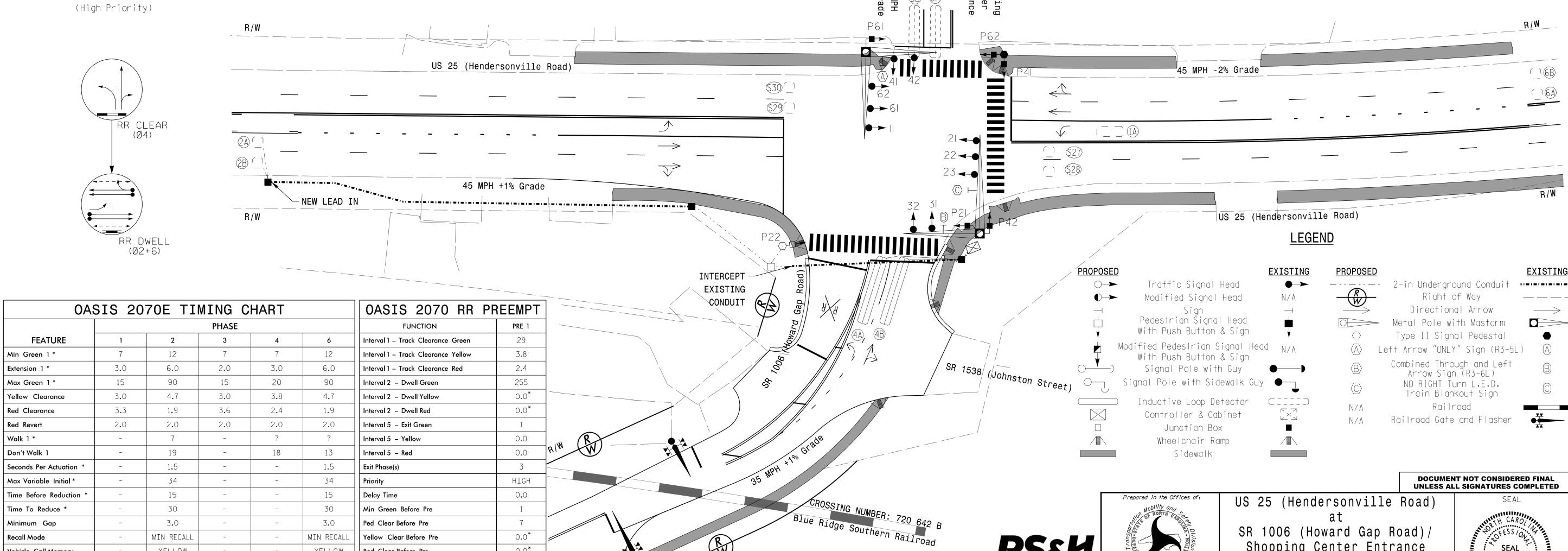
All Heads L.E.D.

22,23

32 42 61,62

P21,P22

- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- <--> PEDESTRIAN MOVEMENT



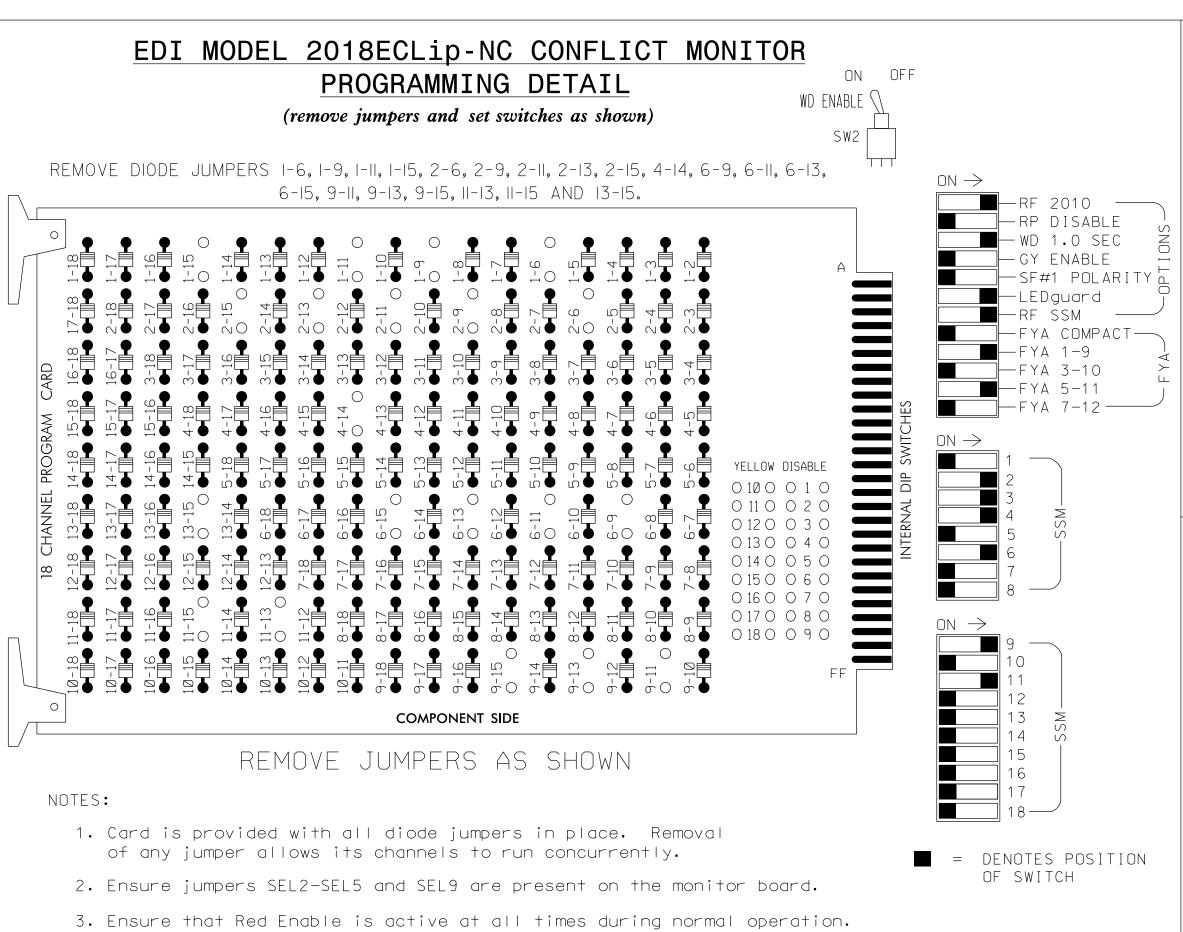
Minimum Gap

Vehicle Call Memory

Simultaneous Gap

Recall Mode

Dual Entry



NOTES

- 1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- 2. Enable Simultaneous Gap-Out for all phases.
- 3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
- 4. Program phases 2 and 6 for Start Up In Green.
- 5. Program phases 2, 4 and 6 for Startup Ped Call.
- 6. Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- 7. The cabinet and controller are part of the US 25 (Hendersonville Road) Closed Loop System.

EQUIPMENT INFORMATION

CONTROLLER.....2070E

SOFTWARE......ECONOLITE OASIS 3.03.32E (OR LATEST APPROVED VERSION)

CABINET MOUNT.....BASE

OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE LOAD SWITCHES USED.....\$1,\$2,\$3,\$4,\$5,\$6,\$8,\$9,

AUX S1,AUX S4.

OVERLAP "A".....1+2

OVERLAP "B".....NOT USED OVERLAP "C".....6

OVERLAP "D".....NOT USED OVERLAP "P".....1+2+3+4+6 SIGNAL HEAD HOOK-LIP CHART

				OIG	אוג	∟ г	ILA	υг	100	η - (JF	$\Box \Box F$	ו חוּ						
S1	S2	S3	S	4	S	5	S6	S7	S8	59	S1Ø	S11	S12	AUX S1	AUX S2	AUX S3	AUX S4	AUX S5	AUX S6
1	2	13		3	2	1	14	5	6	15	7	8	16	9	10	17	11	12	18
1	2	2 PED		3	2	1	4 PED	15	6	6 PED	7	8	8 PED	OLA	OLB	SPARE	OLC	OLD	SPARE
11	22,23	P21, P22	31	32	41	42	P41, P42	NU	61,62	P61, P62	NU	NU	NU	11	NU	NU	21	NU	NU
	128		116	116	1Ø1	1Ø1			134										
*	129		117	117	102	102			135										
	130		118	118	103	103			136										
														A121			A114		
														A122			A115		
														A123			A116		
127			118		103														
		113					104			119									
		115					1Ø6			121									
	1 1 **	1 2 1 2 11 2 11 2 22,23 128	1 2 13 1 2 PED 11	S1 S2 S3 S 1 2 13 3 1 2 PED 3 11 22,23 P21; 31 128 116 * 129 117 130 118 127 1 118	S1 S2 S3 S4 1 2 13 3 11 2 PED 31 32 11* 22,23 P21, P22 31 32 128 116 116 116 ** 129 117 117 130 118 118 118 127 4 113 118 118 127 113 118 4	S1 S2 S3 S4 S 1 2 13 3 4 11 2 PED 3 41 11 22,23 P21, P22 31 32 41 128 116 116 101 * 129 117 117 102 130 118 118 103 127 118 103 103 127 113 118 103	S1 S2 S3 S4 S5 1 2 13 3 4 1 2 PED 3 41 42 11* 22,23 P21, P22 31 32 41 42 128 116 116 101 101 101 ** 129 117 117 102 102 130 118 118 103 103 127 118 118 103 1 127 113 118 103 1 128 113 103 1 1	S1 S2 S3 S4 S5 S6 1 2 13 3 4 14 1 2 $\frac{2}{PED}$ 31 32 41 42 $\frac{P41}{PED}$ 11* 128 116 116 101 101 101 * 129 117 117 102 102 102 130 118 118 103 103 103 127 113 118 103 103 104 127 113 118 103 103 104	S1 S2 S3 S4 S5 S6 S7 1 2 13 3 4 14 5 1 2 P_{ED}^2 31 32 41 42 P_{41}^4 NU 128 116 116 101 101 101 101 * 129 117 117 102 102 102 102 130 118 118 103 103 103 103 103 127 113 118 103 103 104 104 127 113 118 103 103 104 104	S1 S2 S3 S4 S5 S6 S7 S8 1 2 13 3 4 14 5 6 1 2 $\frac{2}{PED}$ 31 32 41 42 $\frac{4}{P42}$ NU 61,62 1 128 116 116 101 101 101 NU 61,62 ** 129 117 117 102 102 1 134 ** 129 118 118 103 103 1 136 130 118 118 103 103 1 1 1 127 113 118 103 1 104 1 1 127 113 118 103 1 <td< td=""><td>S1 S2 S3 S4 S5 S6 S7 S8 S9 1 2 13 3 4 14 5 6 15 1 2 $\frac{2}{PED}$ 3 4 4 $\frac{4}{PED}$ 5 6 $\frac{6}{PED}$ 11** $\frac{1}{PE2}$ 3 3 4 4 $\frac{4}{P42}$ NU 6 $\frac{6}{PED}$ 128 1 1</td><td>S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 1 2 13 3 3 4 4 5 6 15 7 11 2 $\frac{2}{2}$ 31 32 41 42 $\frac{94}{12}$ NU $61,62$ $\frac{96}{10}$ NU 11 $\frac{1}{2}$ $\frac{1}{2}$</td><td>S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 1 2 13 3 3 4 14 5 6 15 7 8 1 2 P2D 31 32 41 42 P4I₂ NU 61,62 P6D NU NU 11* 128 116 116 101 101 101 134 1 1 101 101 134 1 <td< td=""><td>State 1 State 1 State 3 State 3</td><td>S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 AUX 1 2 13 32 41 42 6 5 6 15 7 8 16 9 1 2 $\frac{2}{10}$ $\frac{2}{10}$</td><td>S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 AUX AUX S2 1 2 13 3 3 3<</td><td>S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 AUX AUX AUX S3 1 2 13 32 32 32</td><td>S1 S2 S3 \times \times \times S6 S7 S8 S9 S10 S11 S12 AUX AUX</td><td>$\begin{array}{c ccccccccccccccccccccccccccccccccccc$</td></td<></td></td<>	S1 S2 S3 S4 S5 S6 S7 S8 S9 1 2 13 3 4 14 5 6 15 1 2 $\frac{2}{PED}$ 3 4 4 $\frac{4}{PED}$ 5 6 $\frac{6}{PED}$ 11** $\frac{1}{PE2}$ 3 3 4 4 $\frac{4}{P42}$ NU 6 $\frac{6}{PED}$ 128 1	S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 1 2 13 3 3 4 4 5 6 15 7 11 2 $\frac{2}{2}$ 31 32 41 42 $\frac{94}{12}$ NU $61,62$ $\frac{96}{10}$ NU 11 $\frac{1}{2}$	S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 1 2 13 3 3 4 14 5 6 15 7 8 1 2 P2D 31 32 41 42 P4I ₂ NU 61,62 P6D NU NU 11* 128 116 116 101 101 101 134 1 1 101 101 134 1 <td< td=""><td>State 1 State 1 State 3 State 3</td><td>S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 AUX 1 2 13 32 41 42 6 5 6 15 7 8 16 9 1 2 $\frac{2}{10}$ $\frac{2}{10}$</td><td>S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 AUX AUX S2 1 2 13 3 3 3<</td><td>S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 AUX AUX AUX S3 1 2 13 32 32 32</td><td>S1 S2 S3 \times \times \times S6 S7 S8 S9 S10 S11 S12 AUX AUX</td><td>$\begin{array}{c ccccccccccccccccccccccccccccccccccc$</td></td<>	State 1 State 1 State 3 State 3	S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 AUX 1 2 13 32 41 42 6 5 6 15 7 8 16 9 1 2 $\frac{2}{10}$	S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 AUX AUX S2 1 2 13 3 <	S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 AUX AUX AUX S3 1 2 13 32	S1 S2 S3 \times \times \times S6 S7 S8 S9 S10 S11 S12 AUX AUX	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

- NU = Not Used
- * Denotes install load resistor. See load resistor installation detail this sheet.
- ★ See pictorial of head wiring in detail this sheet.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

OLC RED (A114)-

OLC GREEN (A116)

INPUT FILE POSITION LAYOUT

(front view)

r	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.1	Ø 1	Ø 2	S L	SL	Ø 3	Ø 3	Ø 4	S	SYS. DET.	S L	S	Ø2PED	Ø6 PED	FS
FILE U	1A	2A	O T	Ō T	3A	3B	4A	Ö T	S27	P T	Ö T	DC ISOLATOR	DC ISOLATOR	DC ISOLATOR
	NOT	Ø 2	EMP+	E M P	NOT	NOT	Ø 4	E M P	SYS. DET.	E M P	E M P+	Ø4PED	NUT	ST
	USED	2B	Y	Y	USED	USED	4B	Y	S28	Y	Y	DC ISOLATOR	USED	DC ISOLATOR
1.1	S	Ø 6	S	S	S	S L	S L	S	SYS. DET.	S L	S	S	S	PRE1
FILE U	ÖT	6A	Ō	ÖT	O T	O	Ō	ÖT	S29	O T	D T	O T	O T	AC ISOLATOR
"J"	E M P	Ø 6	E M P	E M P	E M P	E M P	E M P	E M P	SYS. DET.	E M P	E M P	E M P	E M P	NOT
	T Y	6B	T Y	T Y	T Y	T Y	T Y	T Y	S3Ø	T Y	T Y	T Y	T Y	USED
ι	1	^ ^^ F	TC - 1		7.70								0510	

EX.: 1A, 2A, ETC. = LOOP NO.'S

4. Integrate monitor with Ethernet network in cabinet.

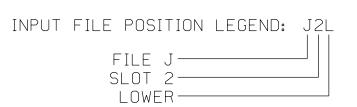
FS = FLASH SENSE ST = STOP TIME PRE1 = RR PREEMPT

INPUT FILE POSITION LEGEND: J2L FILE J-SLOT 2-LOWER-

INPUT FILE CONNECTION & PROGRAMMING CHART

LOOP NO.	LOOP TERMINAL	INPUT FILE POS.	PIN NO.	INPUT ASSIGNMENT NO.	DETECTOR NO.	NEMA PHASE	CALL	EXTEND	FULL TIME DELAY	STRETCH TIME	DELAY TIME
1A	TB2-1,2	I1U	56	18	1	1	Υ	Υ			10
2A	TB2-5,6	I2U	39	1	2	2	Υ	Υ			
2B	TB2-7,8	I2L	43	5	12	2	Υ	Υ			
3A	TB4-5,6	I5U	58	20	3	3	Υ	Υ			3
3B	TB4-9,10	I6U	41	3	4	3	Υ	Υ			10
4A	TB6-1,2	I7U	65	27	34	4	Υ	Υ			3
4B	TB6-3,4	I7L	78	40	44	4	Υ	Υ			10
* S27	TB6-9,10	I9U	6Ø	22	11	SYS					
* S28	TB6-11,12	I9L	62	24	13	SYS					
6A	TB3-5,6	J2U	40	2	6	6	Υ	Υ			
6B	TB3-7,8	J2L	44	6	16	6	Υ	Υ			
* S29	TB7-9,10	J9U	59	21	15	SYS					
* S3Ø	TB7-11,12	J9L	61	23	17	SYS					
PED PUSH BUTTONS							NOT	_ _ _			
P21,P22	TB8-4,6	I12U	67	29	PED 2	2 PED	INSTALL DC ISOLATORS				
P41,P42	TB8-5,6	I12L	69	31	PED 4	4 PED	IN INPUT FILE SLOTS				
P61,P62	TB8-7,9	I13U	68	3Ø	PED 6	6 PED	I12 AND I13.				

* System detector only. Remove the vehicle phase assigned to this detector in the default programming.



<u>NOTE</u>

OLA RED (A121)—

OLA GREEN (A123) —

Ø1 GREEN (127) —

1. The sequence display for signal head 11 requires special logic programming. See sheet 2 for programming instructions.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0593 DESIGNED: January 2018 SEALED: 1-31-2018 REVISED:

Prepared in the Office of: ROWE ENGINEERING, PLLC

PROJECT REFERENCE NO.

Sig 4

R-5207C

FIRM LICENSE NO. P-1675 5013 OLD ELIZABETH ROAD RALEIGH, NC 27616 (919) 623-5593

DOCUMENT NOT CONSIDERED FINAL

UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL DETAIL SHEET 1 OF 3

DETAILS FOR:

US 25 (Hendersonville Road) SR 1006 (Howard Gap Road) Shopping Center Entrance

Henderson County PLAN DATE: January 2018 REVIEWED BY: J.G.Townsend

PREPARED BY: J.T.Rowe REVIEWED BY: John T. Rowe, Jr. 1/31/2018

SIG. INVENTORY NO. 14-0593

LOAD RESISTOR INSTALLATION DETAIL (install resistor as shown below)

AC-

ACCEPTABLE VALUES VALUE (ohms) WATTAGE 1.5K - 1.9K | 25W (min) 2.0K - 3.0K | 10W (min)

PHASE 1 YELLOW FIELD TERMINAL (126)

750 N.Greenfield Pkwy,Garner,NC 27529

ELECTRICAL AND PROGRAMMING

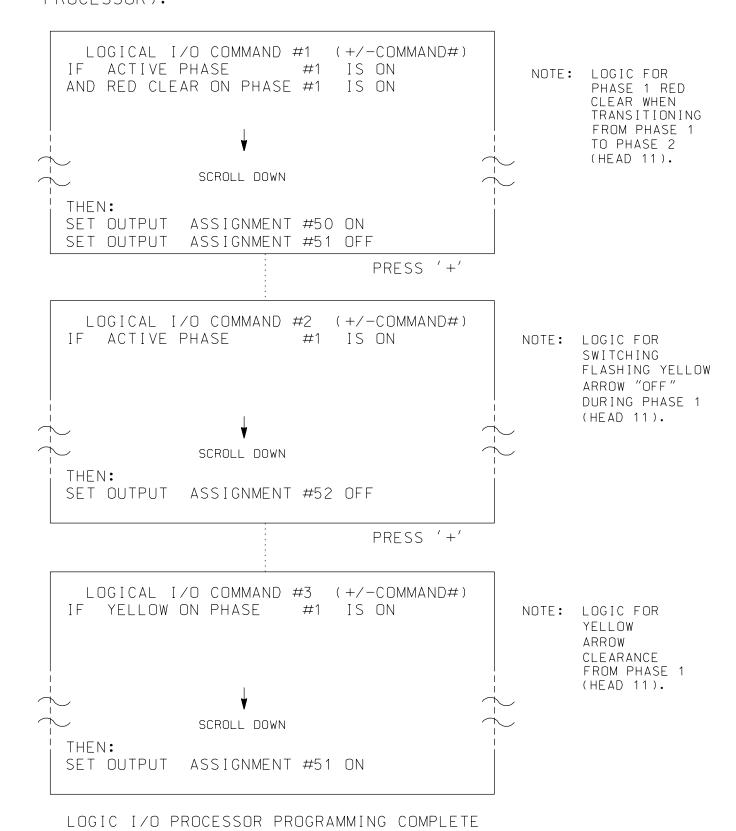
Prepared in the Offices of:

D0847BAGAGAGAGAGAGOURE

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

- 1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2 AND 3.
- 2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



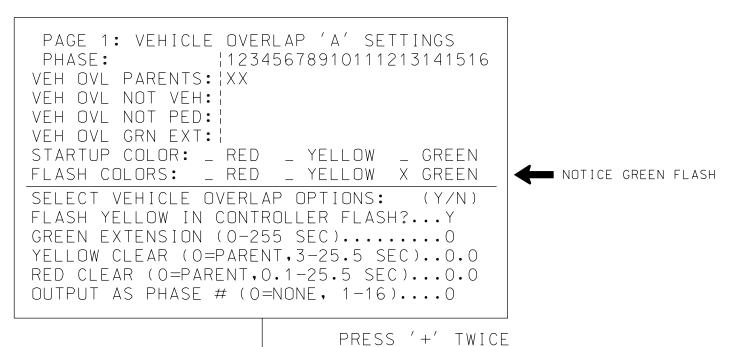
OUTPUT REFERENCE SCHEDULE

OUTPUT 50 = Overlap A Red OUTPUT 51 = Overlap A Yellow OUTPUT 52 = Overlap A Green

OVERLAP PROGRAMMING DETAIL

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).



PAGE 1: VEHICLE OVERLAP 'C' SETTINGS \\ 12345678910111213141516 PHASE: VEH OVL PARENTS: | VEH OVL NOT VEH: | VEH OVL NOT PED: | VEH OVL GRN EXT: | STARTUP COLOR: _ RED _ YELLOW _ GREEN FLASH COLORS: _ RED _ YELLOW X GREEN NOTICE GREEN FLASH SELECT VEHICLE OVERLAP OPTIONS: (Y/N) FLASH YELLOW IN CONTROLLER FLASH?...Y GREEN EXTENSION (0-255 SEC)..... YELLOW CLEAR (O=PARENT, 3-25.5 SEC)..0.0 RED CLEAR (0=PARENT, 0.1-25.5 SEC)...0.0 OUTPUT AS PHASE # (0=NONE, 1-16)...0

PRESS '+' TO ADVANCE TO OVERLAP 'P'

PAGE 1: VEHICLE OVERLAP 'P' SETTINGS PHASE: 12345678910111213141516 VEH OVL PARENTS: XXXX X VEH OVL NOT VEH: | VEH OVL NOT PED: | VEH OVL GRN EXT: STARTUP COLOR: _ RED _ YELLOW _ GREEN FLASH COLORS: _ RED _ YELLOW _ GREEN SELECT VEHICLE OVERLAP OPTIONS: (Y/N) FLASH YELLOW IN CONTROLLER FLASH?...N GREEN EXTENSION (0-255 SEC)..... YELLOW CLEAR (O=PARENT,3-25.5 SEC)..O.O RED CLEAR (0=PARENT, 0.1-25.5 SEC)...0.0 OUTPUT AS PHASE # (0=NONE, 1-16)....0

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0593 DESIGNED: January 2018 SEALED: 1-31-2018 REVISED:

> Prepared in the Office of: ROWE ENGINEERING, PLLC

> > FIRM LICENSE NO. P-1675 *5013 OLD ELIZABETH ROAD* RALEIGH, NC 27616 (919) 623-5593

ELECTRICAL DETAIL SHEET 2 OF 3

DETAILS FOR:

ELECTRICAL AND PROGRAMMING

Prepared in the Offices of:

750 N.Greenfield Pkwy,Garner,NC 27529

US 25 (Hendersonville Road)

SR 1006 (Howard Gap Road) Shopping Center Entrance Henderson County Division 14

PLAN DATE: January 2018 REVIEWED BY: J.G.Townsend PREPARED BY: J.T.Rowe REVIEWED BY: REVISIONS

DOCUMENT NOT CONSIDERED FINAL

UNLESS ALL SIGNATURES COMPLETED

INIT. DATE DocuSigned by John T. Rowe, Jr. 1/31/2018 D0847BABABABABATOO!RE SIG. INVENTORY NO. 14-0593

RAILROAD PREEMPTION PROGRAMMING DETAIL

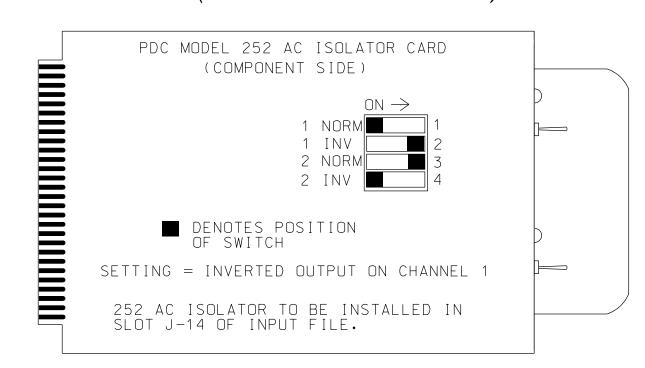
(program controller as shown below)

From Main Menu press 'A' (Preemption), then '1' (Standard Preemptions).

PREEMPTION #1 SETTI	NGS (NEXT:1-10)
	/DWELL PHASES 8910111213141516
1 29 3.8 2.4 X 2 255 0.0 0.0 X X 3 0 0.0 0.0	
4 0 0.0 0.0 5 1 0.0 0.0 X	
EXIT CALLS OPTIONS	
PRIORITY (Y/N TO SELECT) DELAY TIMER (0-255 SEC) MIN GREEN BEFORE PRE (0= PED CLEAR BEFORE PRE (0=	
YELLOW CLEAR BEFORE PRE	(O= DEFAULT).0.0 DEFAULT)0.0
DWELL MAX TIMER (0=0FF,1 DWELL HOLD-OVER TIMER (0	-255MIN)O
LINK TO NEXT PREEMPT? ENABLE BACKUP PROTECTION	N
HOLD CLEAR 1 PHASES DURI FAST GREEN FLASH DWELL P PED CLEARANCE THROUGH YE	HASES?N
INHIBIT OVERLAP GREEN EX SERVICE DURING SOFTWARE	FLASH?N
REST IN RED DURING DWELL FLASH DWELL INTERVAL? ALLOW PEDS IN DWELL INTE	
RE-TIME DWELL INTERVAL? OVERLAPS:	ABCDEFGHIJKLMNOP
DWELL INT FLASH YELLOW OMIT OVERLAPS:	X

PREEMPT 1 AC ISOLATOR (MODEL 252) OUTPUT PROGRAMMING DETAIL

(set DIP switches as shown below)

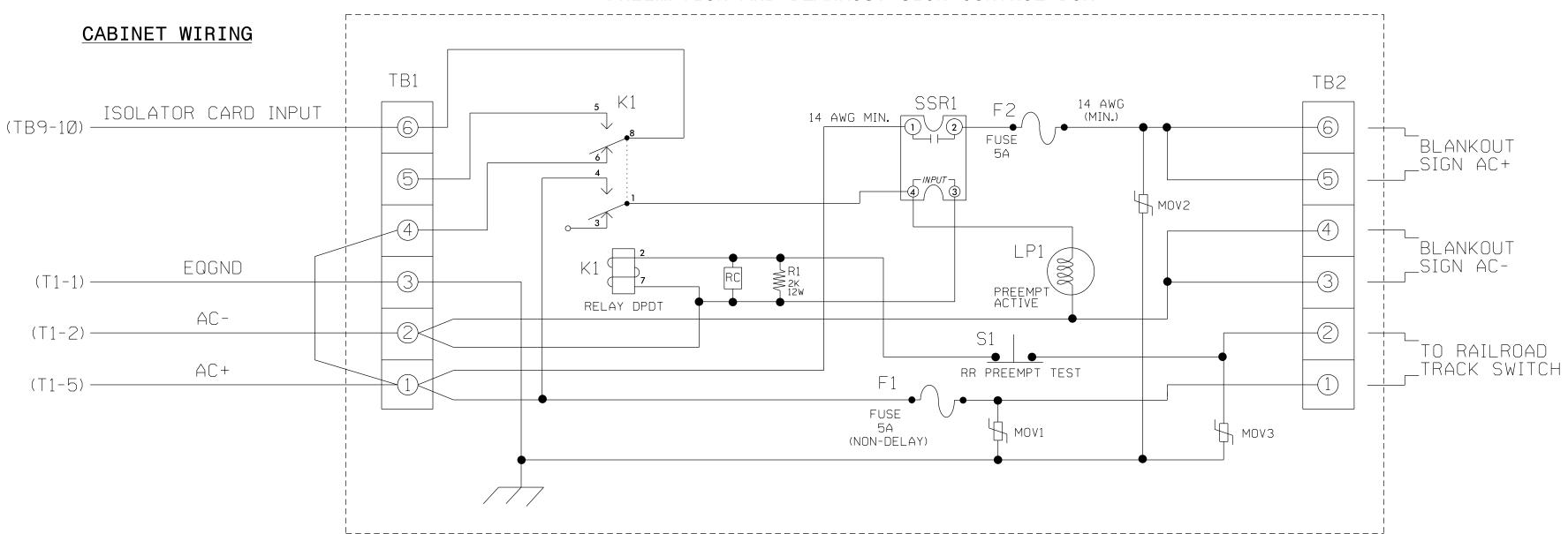


NOTE: IF ANOTHER MANUFACTURER TYPE OF AC ISOLATOR IS USED, OUTPUT PROGRAMMING IS LIKELY NOT TO EQUATE TO THAT SHOWN ABOVE.

RAILROAD PREEMPTION WIRING DETAIL

(wire as shown below)

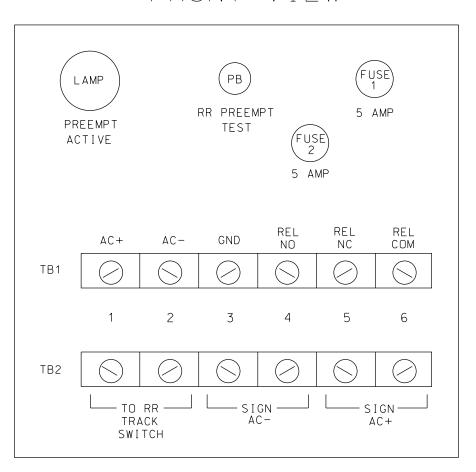
PREEMPTION AND BLANKOUT SIGN CONTROL BOX



NOTES

- 1. Relay K1 is shown in the energized (Preempt not active) normal operation state.
- 2. Relay K1 is a DPDT with 120VAC coil with octal base.
- 3. Relay SSR1 is a SPST (normally open) Solid State Relay with AC input and AC (25 amp) output.
- 4. AC Isolator Card shall activate preemption upon removal of AC+ from the input (as shown above). To accomplish this set invert dip switch on AC Isolator Card.
- 5. IMPORTANT!! A jumper must be added between input file terminals J14-E and J14-K if not already present. Also, terminal TB9-12 (on input panel) shall be connected to AC neutral (jumper may have to be added).

FRONT VIEW

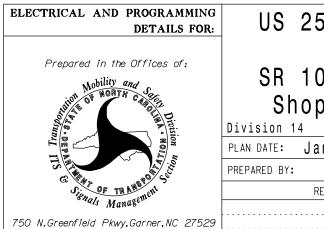


Prepared in the Office of: ROWE ENGINEERING, PLLC

> FIRM LICENSE NO. P-1675 *5013 OLD ELIZABETH ROAD* RALEIGH, NC 27616 (919) 623-5593

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 14-0593 DESIGNED: January 2018 SEALED: 1-31-2018 REVISED:

Electrical Detail - Sheet 3 of 3



US 25 (Hendersonville Road) SR 1006 (Howard Gap Road)

Shopping Center Entrance
Division 14 Henderson County Fle

PLAN DATE: January 2018 REVIEWED BY: J.G. Townsend PREPARED BY: J.T.Rowe REVIEWED BY: REVISIONS

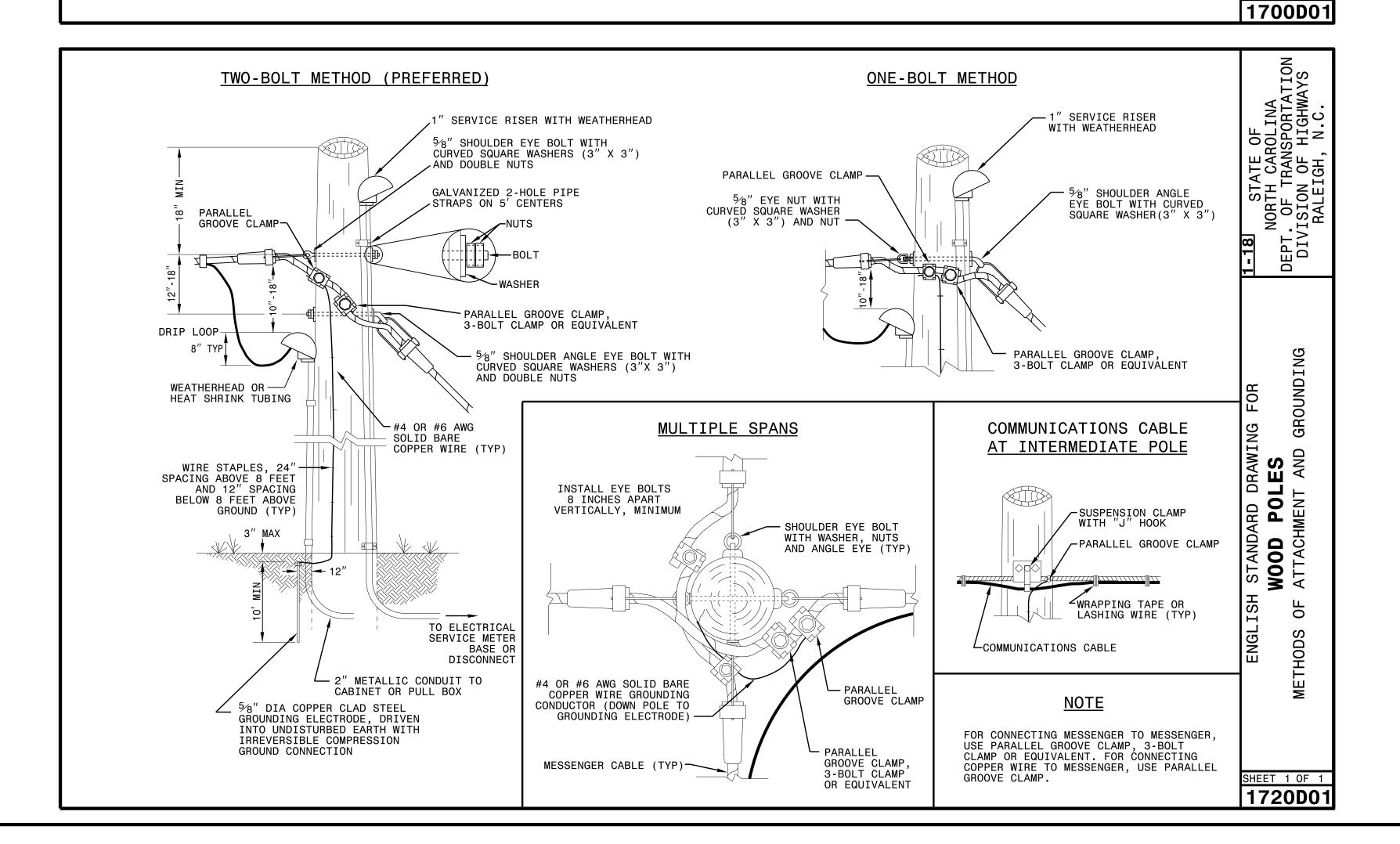
INIT. DATE DocuSigned John T. Rowe, Jr. 1/31/2018 D0847BA0ACA9400... SIG. INVENTORY NO. 14-0593

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SEAL 008453

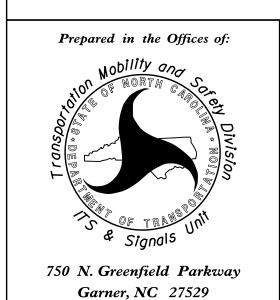
1-18 STATE OF
NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C. MESSENGER CABLE_ CONDUCTOR TO POWER GROUNDING CONNECTION SYSTEM POLE GROUND METER BASE CONNECTION LOCK NUT #8 AWG MIN #8 AWG MIN STRANDED COPPER (BLACK) STRANDED COPPER (WHITE) SERVICE DISCONNECT 120 V SINGLE - NEUTRAL BUS POLE BREAKER MAIN BONDING SCREW #8 AWG MIN _ STRANDED COPPER (WHITE) #6 AWG MIN ICE GROUNDING

BONDING GREEN INSULATED #8 AWG MIN STRANDED COPPER (BLACK) STRANDED COPPER WIRE GROUNDING/BONDING BUSHING-#4 AWG SOLID BARE - COPPER WIRE TO GROUNDING ELECTRODE LOCK NUTS -FOR JOINT USE POLES ONLY, #6 AWG MIN SOLID BARE COPPER WITH SPLIT BOLT CONNECTORS OR SYSTEM PARALLEL GROOVE CLAMPS ON EACH END (CONNECTION TO BE MADE ABOVE SPECIAL ROUTING SHOWN BELOW) WIRE STAPLES, 24" SPACING ABOVE 8 FEET AND 12" SPACING BELOW 8 FEET ABOVE GROUND (TYP) TRICAL SERVIC PROVIDE WIRING ROUTING AND STAPLING SO THAT STAPLES MAY BE TEMPORARILY REMOVED AND GROUNDING WIRES CAN BE PULLED MIN 1.5" OFF POLE & SPACED MAX 0.75" APART TO ENABLE TESTING OF GROUNDING ELECTRICAL SERVICE
TO CABINET ELECTRODE RESISTANCE BY CLAMP ON TESTER S Ш 5/8" DIA COPPER CLAD STEEL GROUNDING ELECTRODES, WITH ᆸ IRREVERSIBLE COMPRESSION GROUND CONNECTOR

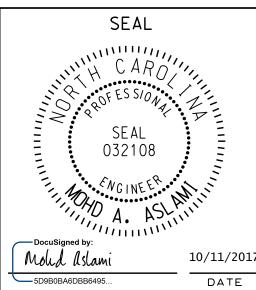


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See Plate for Title



SHEET 1 OF 1



SHEET NO

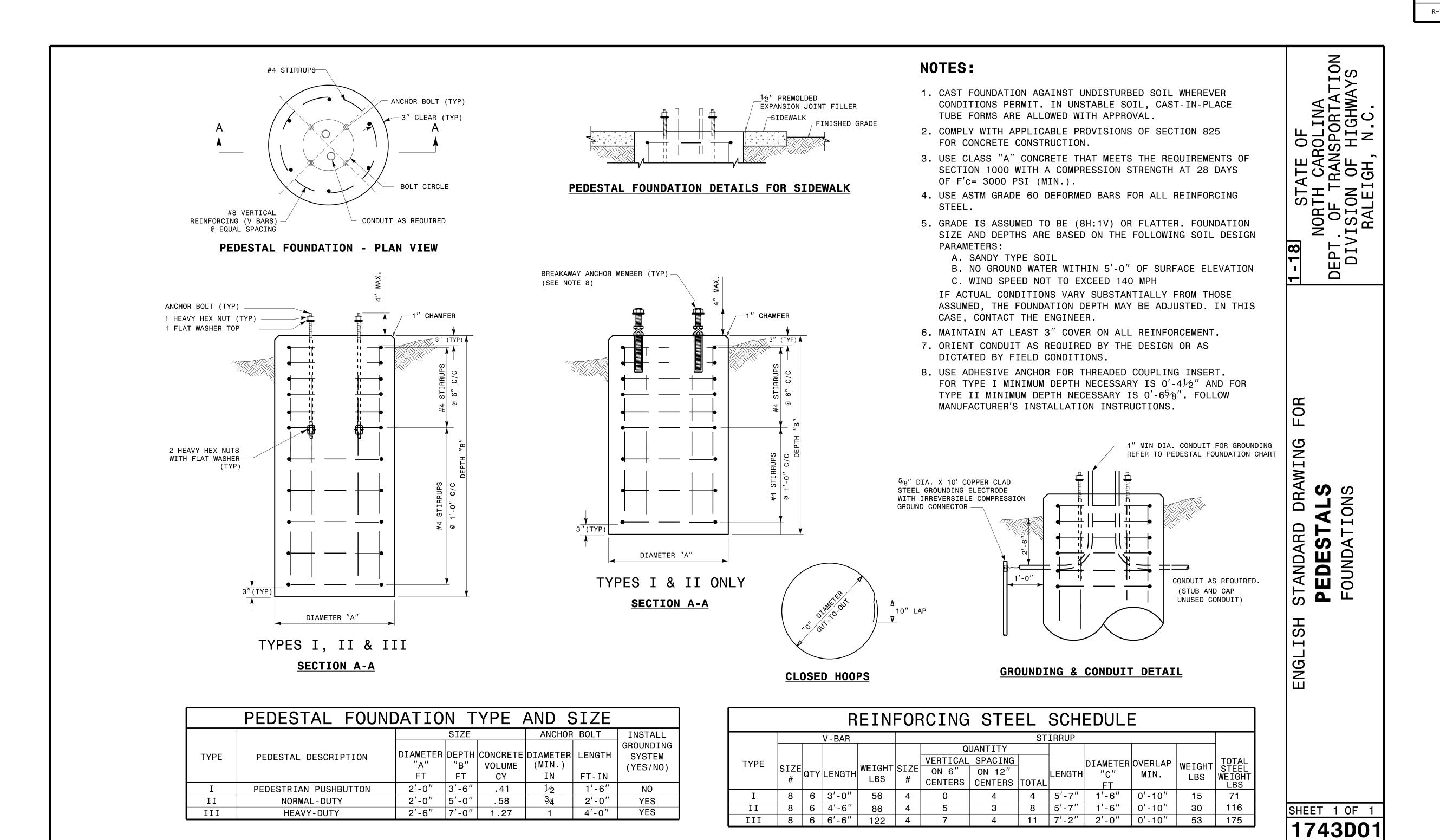
Sig. 7

R-5207C

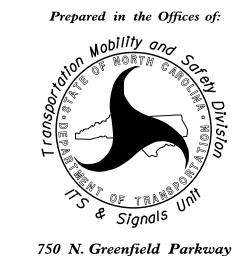
OCT-2017 08:56 2018 Std Drawings*Plate Sheets*2018_Plate

 PROJECT NO.
 SHEET NO.

 -5207C
 Sig. 8



See Plate for Title



Garner, NC 27529

SEAL

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O28094

Docusigned by:

Outside C. Sarkar

A4E8E32E147E4C4...

DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED R-5207C

TS-1

Henderson County



PROJECT SPECIAL PROVISIONS
Howard Gap Road Widening from Jackson Road to US 25
Traffic Signals

N.C. Project No. R-5207C (WBS # 45393.1.2)

(Based on NCDOT Signals and Intelligent Transportation Systems Project Special Provisions Version 18.1)

Prepared By: SGH 31-Jan-18

Prepared By:

RS&H

8521 Six Forks Road, Suite 400

Raleigh, NC 27615 NCBEES # F-0493

Document not considered final unless all signatures completed.

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1. 2018 STANDARD SPECIFICATIONS FOR ROADS & STRUCTURES

The 2018 Standard Specifications are revised as follows:

1.1. Controllers with Cabinets – Material (1751-2)

Page 17-38, Section 1751-2 Material

Add the following paragraph:

When the plans or specifications require a Type 2070L controller, contractor may provide a Type 2070E controller. Unless otherwise allowed by the Engineer, provide controllers of only one type.

2. SIGNAL HEADS

2.1. MATERIALS

A. General:

Fabricate vehicle signal head housings and end caps from die-cast aluminum. Fabricate 12-inch and 16-inch pedestrian signal head housings and end caps from die-cast aluminum. Fabricate 9-inch pedestrian signal head housings, end caps, and visors from virgin polycarbonate material. Provide visor mounting screws, door latches, and hinge pins fabricated from stainless steel. Provide interior screws, fasteners, and metal parts fabricated from stainless steel.

Fabricate tunnel and traditional visors from sheet aluminum.

Paint all surfaces inside and outside of signal housings and doors. Paint outside surfaces of tunnel and traditional visors, wire outlet bodies, wire entrance fitting brackets and end caps when supplied as components of messenger cable mounting assemblies, pole and pedestal mounting assemblies, and pedestrian pushbutton housings. Have electrostatically-applied, fused-polyester paint in highway yellow (Federal Standard 595C, Color Chip Number 13538) a minimum of 2.5 to 3.5 mils thick. Do not apply paint to the latching hardware, rigid vehicle signal head mounting brackets for mast-arm attachments, messenger cable hanger components or balance adjuster components.

Have the interior surfaces of tunnel and traditional visors painted an alkyd urea black synthetic baking enamel with a minimum gloss reflectance and meeting the requirements of MIL-E-10169, "Enamel Heat Resisting, Instrument Black."

Where required, provide polycarbonate signal heads and visors that comply with the provisions pertaining to the aluminum signal heads listed on the QPL with the following exceptions:

Fabricate signal head housings, end caps, and visors from virgin polycarbonate material. Provide UV stabilized polycarbonate plastic with a minimum thickness of 0.1 ± 0.01 inches that is highway yellow (Federal Standard 595C, Color Chip 13538). Ensure the color is incorporated into the plastic material before molding the signal head housings and end caps. Ensure the plastic formulation provides the following physical properties in the assembly (tests may be performed on separately molded specimens):

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Test	Required	Method
Specific Gravity	1.17 minimum	ASTM D 792
Flammability	Self-extinguishing	ASTM D 635
Tensile Strength, yield, PSI	8500 minimum	ASTM D 638
Izod impact strength, ft-lb/in [notched, 1/8 inch]	12 minimum	ASTM D 256

For pole mounting, provide side of pole mounting assemblies with framework and all other hardware necessary to make complete, watertight connections of the signal heads to the poles and pedestals. Fabricate the mounting assemblies and frames from aluminum with all necessary hardware, screws, washers, etc. to be stainless steel. Provide mounting fittings that match the positive locking device on the signal head with the serrations integrally cast into the brackets. Provide upper and lower pole plates that have a 1 ¼-inch vertical conduit entrance hubs with the hubs capped on the lower plate and 1 ½-inch horizontal hubs. Ensure that the assemblies provide rigid attachments to poles and pedestals so as to allow no twisting or swaying of the signal heads. Ensure that all raceways are free of sharp edges and protrusions, and can accommodate a minimum of ten Number 14 AWG conductors.

For pedestal mounting, provide a post-top slipfitter mounting assembly that matches the positive locking device on the signal head with serrations integrally cast into the slipfitter. Provide stainless steel hardware, screws, washers, etc. Provide a minimum of six 3/8 X 3/4-inch long square head bolts for attachment to pedestal. Provide a center post for multi-way slipfitters.

For light emitting diode (LED) traffic signal modules, provide the following requirements for inclusion on the Department's Qualified Products List for traffic signal equipment.

- 1. Sample submittal,
- 2. Third-party independent laboratory testing results for each submitted module with evidence of testing and conformance with all of the Design Qualification Testing specified in section 6.4 of each of the following Institute of Transportation Engineers (ITE) specifications:
 - Vehicle Traffic Control Signal Heads Light Emitting Diode (LED) Circular Signal Supplement
 - Vehicle Traffic Control Signal Heads Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement
 - Pedestrian Traffic Control Signal Indications –Light Emitting Diode (LED) Signal Modules.

(Note: The Department currently recognizes two approved independent testing laboratories. They are Intertek ETL Semko and Light Metrics, Incorporated with Garwood Laboratories. Independent laboratory tests from other laboratories may be considered as part of the QPL submittal at the discretion of the Department,

- 3. Evidence of conformance with the requirements of these specifications,
- 4. A manufacturer's warranty statement in accordance with the required warranty, and
- 5. Submittal of manufacturer's design and production documentation for the model, including but not limited to, electrical schematics, electronic component values, proprietary part numbers, bill of materials, and production electrical and photometric test parameters.

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6. Evidence of approval of the product to bear the Intertek ETL Verified product label for LED traffic signal modules.

In addition to meeting the performance requirements for the minimum period of 60 months, provide a written warranty against defects in materials and workmanship for the modules for a period of 60 months after installation of the modules. During the warranty period, the manufacturer must provide new replacement modules within 45 days of receipt of modules that have failed at no cost to the State. Repaired or refurbished modules may not be used to fulfill the manufacturer's warranty obligations. Provide manufacturer's warranty documentation to the Department during evaluation of product for inclusion on Qualified Products List (QPL).

B. Pedestrian Signal Heads:

Provide pedestrian signal heads with international symbols that meet the MUTCD. Do not provide letter indications.

Comply with the ITE standard for "Pedestrian Traffic Control Signal Indications" and the following sections of the ITE standard for "Vehicle Traffic Control Signal Heads" in effect on the date of advertisement:

- Section 3.00 "Physical and Mechanical Requirements"
- Section 4.01 "Housing, Door, and Visor: General"
- Section 4.04 "Housing, Door, and Visor: Materials and Fabrication"
- Section 7.00 "Exterior Finish"

Provide a double-row termination block with three empty terminals and number 10 screws for field wiring. Provide barriers between the terminals that accommodate a spade lug sized for number 10 terminal screws. Mount the termination block in the hand section. Wire all signal sections to the terminal block.

Where required by the plans, provide 16-inch pedestrian signal heads with traditional three-sided, rectangular visors, 6 inches long. Where required by the plans, provide 12-inch pedestrian signal heads with traditional three-sided, rectangular visors, 8 inches long.

Provide 2-inch diameter pedestrian push-buttons with weather-tight housings fabricated from die-cast aluminum and threading in compliance with the NEC for rigid metal conduit. Provide a weep hole in the housing bottom and ensure that the unit is vandal resistant.

Provide push-button housings that are suitable for mounting on flat or curved surfaces and that will accept 1/2-inch conduit installed in the top. Provide units that have a heavy duty push-button assembly with a sturdy, momentary, normally-open switch. Have contacts that are electrically insulated from the housing and push-button. Ensure that the push-buttons are rated for a minimum of 5 mA at 24 volts DC and 250 mA at 12 volts AC.

Provide standard R10-3 signs with mounting hardware that comply with the MUTCD in effect on the date of advertisement. Provide R10-3E signs for countdown pedestrian heads and R10-3B for non-countdown pedestrian heads.

Design the LED pedestrian traffic signal modules (hereafter referred to as modules) for installation into standard pedestrian traffic signal sections that do not contain the incandescent signal section reflector, lens, eggcrate visor, gasket, or socket. Provide modules that consist of an assembly that uses LEDs as the light source in lieu of an incandescent lamp. Use LEDs that are of the latest

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aluminum indium gallium phosphorus (AlInGaP) technology for the Portland Orange hand and countdown displays. Use LEDs that are of the latest indium gallium nitride (InGaN) technology for the Lunar White walking man displays. Install the ultra-bright type LEDs that are rated for 100,000 hours of continuous operation from -40°F to +165°F. Design modules to have a minimum useful life of 60 months and to meet all parameters of this specification during this period of useful life.

Design all modules to operate using a standard 3 - wire field installation. Provide spade terminals crimped to the lead wires and sized for a #10 screw connection to the existing terminal block in a standard pedestrian signal housing. Do not provide other types of crimped terminals with a spade adapter.

Ensure the power supply is integral to the module assembly. On the back of the module, permanently mark the date of manufacture (month & year) or some other method of identifying date of manufacture.

Provide modules in the following configuration: 16-inch displays which have the solid hand/walking man overlay on the left and the countdown on the right, and 12-inch displays which have the solid hand/walking man module as an overlay. All makes and models of LED modules purchased for use on the State Highway System shall appear on the current NCDOT Traffic Signal Qualified Products List (QPL).

Provide the manufacturer's model number and the product number (assigned by the Department) for each module that appears on the 2012 or most recent Qualified Products List. In addition, provide manufacturer's certification in accordance with Article 106-3 of the *Standard Specifications*, that each module meets or exceeds the ITE "Pedestrian Traffic Control Signal Indicators - Light Emitting Diode (LED) Signal Modules" dated August 04, 2010 (hereafter referred to as PTCSI Pedestrian Standard) and other requirements stated in this specification.

Provide modules that meet the following requirements when tested under the procedures outlined in the PTCSI Pedestrian Standard:

Module Type	Max. Wattage at 165° F	Nominal Wattage at 77° F
Hand Indication	16	13
Walking Man Indication	12	9
Countdown Indication	16	13

Note: Use a wattmeter having an accuracy of $\pm 1\%$ to measure the nominal wattage and maximum wattage of a circular traffic signal module. Power may also be derived from voltage, current and power factor measurements.

Provide module lens that is hard coated or otherwise made to comply with the material exposure and weathering effects requirements of the Society of Automotive Engineers (SAE) J576. Ensure all exposed components of the module are suitable for prolonged exposure to the environment, without appreciable degradation that would interfere with function or appearance.

Ensure the countdown display continuously monitors the traffic controller to automatically learn the pedestrian phase time and update for subsequent changes to the pedestrian phase time.

Ensure the countdown display begins normal operation upon the completion of the preemption sequence and no more than one pedestrian clearance cycle.

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C. Signal Cable:

Furnish 16-4 and 16-7 signal cable that complies with IMSA specification 20-1 except provide the following conductor insulation colors:

- For 16-4 cable: white, yellow, red, and green
- For 16-7 cable: white, yellow, red, green, yellow with black stripe tracer, red with black stripe tracer, and green with black stripe tracer. Apply continuous stripe tracer on conductor insulation with a longitudinal or spiral pattern.

Provide a ripcord to allow the cable jacket to be opened without using a cutter. IMSA specification 19-1 will not be acceptable. Provide a cable jacket labeled with the IMSA specification number and provide conductors constructed of stranded copper.

3. CONTROLLERS WITH CABINETS

3.1.MATERIALS – GENERAL CABINETS

Provide a moisture resistant coating on all circuit boards.

Provide one 20 mm diameter radial lead UL-recognized metal oxide varistor (MOV) between each load switch field terminal and equipment ground. Electrical performance is outlined below.

PROPERTIES OF MOV SURGE PROTECTOR							
Maximum Continuous Applied Voltage at	150 VAC (RMS)						
185° F	200 VDC						
Maximum Peak 8x20μs Current at 185° F	6500 A						
Maximum Energy Rating at 185° F	80 J						
Voltage Range 1 mA DC Test at 77° F	212-268 V						
Max. Clamping Voltage 8x20μs, 100A at 77° F	395 V						
Typical Capacitance (1 MHz) at 77° F	1600 pF						

Provide a power line surge protector that is a two-stage device that will allow connection of the radio frequency interference filter between the stages of the device. Ensure that a maximum continuous current is at least 10A at 120V. Ensure that the device can withstand a minimum of 20 peak surge current occurrences at 20,000A for an 8x20 microsecond waveform. Provide a maximum clamp voltage of 395V at 20,000A with a nominal series inductance of 200 µh. Ensure that the voltage does not exceed 395V. Provide devices that comply with the following:

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Frequency (Hz)	Minimum Insertion Loss (dB)
60	0
10,000	30
50,000	55
100,000	50
500,000	50
2,000,000	60
5,000,000	40
10,000,000	20
20,000,000	25

3.2. MATERIALS – TYPE 170E CABINETS

A. Type 170 E Cabinets General:

Conform to the city of Los Angeles' Specification No. 54-053-08, *Traffic Signal Cabinet Assembly Specification* (dated July 2008), except as required herein.

Furnish model 336S pole mounted cabinets configured for 8 vehicle phases, 4 pedestrian phases, and 6 overlaps. Do not reassign load switches to accommodate overlaps unless shown on electrical details. Provide 336S pole mounted cabinets that are 46" high with 40" high internal rack assemblies.

Furnish model 332 base mounted cabinets configured for 8 vehicle phases, 4 pedestrian phases, and 6 overlaps. When overlaps are required, provide auxiliary output files for the overlaps. Do not reassign load switches to accommodate overlaps unless shown on electrical details.

Provide model 200 load switches, model 222 loop detector sensors, model 252 AC isolators, and model 242 DC isolators according to the electrical details. As a minimum, provide one (1) model 2018 conflict monitor, one (1) model 206L power supply unit, two (2) model 204 flashers, one (1) DC isolator (located in slot I14), and four (4) model 430 flash transfer relays (provide seven (7) model 430 flash transfer relays if auxiliary output file is installed) with each cabinet.

B. Type 170 E Cabinet Electrical Requirements:

Provide a cabinet assembly designed to ensure that upon leaving any cabinet switch or conflict monitor initiated flashing operation, the controller starts up in the programmed start up phases and start up interval.

Furnish two sets of non-fading cabinet wiring diagrams and schematics in a paper envelope or container and placed in the cabinet drawer.

All AC+ power is subject to radio frequency signal suppression.

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Provide surge suppression in the cabinet for each type of cabinet device. Provide surge protection for the full capacity of the cabinet input file. Provide surge suppression devices that operate properly over a temperature range of -40° F to +185° F. Ensure the surge suppression devices provide both common and differential modes of protection.

Provide a pluggable power line surge protector that is installed on the back of the PDA (power distribution assembly) chassis to filter and absorb power line noise and switching transients. Ensure the device incorporates LEDs for failure indication and provides a dry relay contact closure for the purpose of remote sensing. Ensure the device meets the following specifications:

Peak Surge Current (Single pulse, 8x20μs)	20,000A
Occurrences (8x20µs waveform)	10 minimum @ 20,000A
Maximum Clamp Voltage	395VAC
Operating Current	15 amps
Response Time	< 5 nanoseconds

Provide a loop surge suppressor for each set of loop terminals in the cabinet. Ensure the device meets the following specifications:

Peak Surge Current (6 times, 8x20µs)	
(Differential Mode)	400A
(Common Mode)	1,000A
Occurrences (8x20µs waveform)	500 min @ 200A
Maximum Clamp Voltage	
(Differential Mode @400A)	35V
(Common Mode @1,000A)	35V
Response Time	< 5 nanoseconds
Maximum Capacitance	35 pF

Provide a data communications surge suppressor for each communications line entering or leaving the cabinet. Ensure the device meets the following specifications:

Peak Surge Current (Single pulse, 8x20μs)	10,000A
Occurrences (8x20µs waveform)	100 min @ 2,000A
Maximum Clamp Voltage	Rated for equipment protected
Response Time	< 1 nanosecond

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 Maximum Capacitance
 1,500 pF

 Maximum Series Resistance
 15Ω

Provide a DC signal surge suppressor for each DC input channel in the cabinet. Ensure the device meets the following specifications:

Peak Surge Current (Single pulse, 8x20μs).....10,000A

Occurrences (8x20μs waveform)......100 @ 2,000A

Maximum Clamp Voltage......30V

Response Time......<1 nanosecond

Provide a 120 VAC signal surge suppressor for each AC+ interconnect signal input. Ensure the device meets the following specifications:

Peak Surge Current (Single pulse, $8x20\mu s$)......20,000A

Maximum Clamp Voltage.......350VAC

Response Time......< 200 nanoseconds

Discharge Voltage.....<200 Volts @ 1,000A

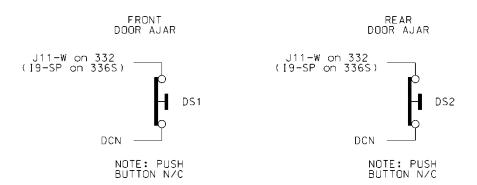
Insulation Resistance..... \geq 100 M Ω

Provide conductors for surge protection wiring that are of sufficient size (ampacity) to withstand maximum overcurrents which could occur before protective device thresholds are attained and current flow is interrupted.

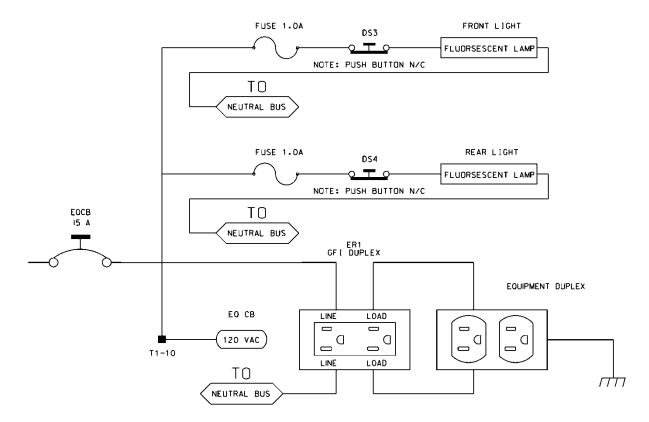
If additional surge protected power outlets are needed to accommodate fiber transceivers, modems, etc., install a UL listed, industrial, heavy-duty type power outlet strip with a minimum rating of 15 A / 125 VAC, 60 Hz. Provide a strip that has a minimum of 3 grounded outlets. Ensure the power outlet strip plugs into one of the controller unit receptacles located on the rear of the PDA. Ensure power outlet strip is mounted securely; provide strain relief if necessary.

Provide a door switch in the front and a door switch in the rear of the cabinet that will provide the controller unit with a Door Ajar alarm when either the front or the rear door is open. Ensure the door switches apply DC ground to the Input File when either the front door or the rear door is open.

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Furnish a fluorescent fixture in the rear across the top of the cabinet and another fluorescent fixture in the front across the top of the cabinet at a minimum. Ensure that the fixtures provide sufficient light to illuminate all terminals, labels, switches, and devices in the cabinet. Conveniently locate the fixtures so as not to interfere with a technician's ability to perform work on any devices or terminals in the cabinet. Provide a protective diffuser to cover exposed bulbs. Install 16 watt T-4 lamps in the fluorescent fixtures. Provide a door switch to provide power to each fixture when the respective door is open. Wire the fluorescent fixtures to the 15 amp ECB (equipment circuit breaker).



Furnish a police panel with a police panel door. For model 336S cabinets, mount the police panel on the rear door. Ensure that the police panel door permits access to the police panel when the main door is closed. Ensure that no rainwater can enter the cabinet even with the police panel door open. Provide a police panel door hinged on the right side as viewed from the front. Provide a police panel

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door lock that is keyed to a standard police/fire call box key. In addition to the requirements of LA Specification No. 54-053-08, provide the police panel with a toggle switch connected to switch the intersection operation between normal stop-and-go operation (AUTO) and manual operation (MANUAL). Ensure that manual control can be implemented using inputs and software such that the controller provides full programmed clearance times for the yellow clearance and red clearance for each phase while under manual control.

Provide a 1/4-inch locking phone jack in the police panel for a hand control to manually control the intersection. Provide sufficient room in the police panel for storage of a hand control and cord.

Ensure the 336S cabinet Input File is wired as follows:

	336S Cabinet													
				Po	rt-Bit	/C-1 P	in Ass	signm	ent					
Slot#	1	2	3	4	5	6	7	8	9	10	11	12	13	14
C-1 (Spares)	59	60	61	62	63	64	65	66	75	76	77	78	79	80
Port	3-2	1-1	3-4	1-3	3-1	1-2	3-3	1-4	2-5	5-5	5-6	5-1	5-2	6-7
C-1	56	39	58	41	55	40	57	42	51	71	72	67	68	81
Port	2-1	1-5	2-3	1-7	2-2	1-6	2-4	1-8	2-6	5-7	5-8	5-3	5-4	6-8
C-1	47	43	49	45	48	44	50	46	52	73	74	69	70	82

For model 332 base mounted cabinets, ensure terminals J14-E and J14-K are wired together on the rear of the Input File. Connect TB9-12 (J14 Common) on the Input Panel to T1-2 (AC-) on the rear of the PDA.

Provide detector test switches mounted at the top of the cabinet rack or other convenient location which may be used to place a call on each of eight phases based on the chart below. Provide three positions for each switch: On (place call), Off (normal detector operation), and Momentary On (place momentary call and return to normal detector operation after switch is released). Ensure that the switches are located such that the technician can read the controller display and observe the intersection.

Connect detector test switches for cabinets as follows:

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336S Cabinet	t	332 Cabinet		
Detector Call Switches Terminals		Detector Call Switches	Terminals	
Phase 1	I1-F	Phase 1	I1-W	
Phase 2	I2-F	Phase 2	I4-W	
Phase 3	I3-F	Phase 3	I5-W	
Phase 4	I4-F	Phase 4	I8-W	
Phase 5	I5-F	Phase 5	J1-W	
Phase 6	I6-F	Phase 6	J4-W	
Phase 7	I7-F	Phase 7	J5-W	
Phase 8	I8-F	Phase 8	J8-W	

Provide the PCB 28/56 connector for the conflict monitor unit (CMU) with 28 independent contacts per side, dual-sided with 0.156 inch contact centers. Provide the PCB 28/56 connector contacts with solder eyelet terminations. Ensure all connections to the PCB 28/56 connector are soldered to the solder eyelet terminations.

Ensure that all cabinets have the CMU connector wired according to the 332 cabinet connector pin assignments (include all wires for auxiliary output file connection). Wire pins 13, 16, R, and U of the CMU connector to a separate 4 pin plug, P1, as shown below. Provide a second plug, P2, which will mate with P1 and is wired to the auxiliary output file as shown below. Provide an additional plug, P3, which will mate with P1 and is wired to the pedestrian yellow circuits as shown below. When no auxiliary output file is installed in the cabinet, provide wires for the green and yellow inputs for channels 11, 12, 17, and 18, the red inputs for channels 17 and 18, and the wires for the P2 plug. Terminate the two-foot wires with ring type lugs, insulated, and bundled for optional use.

	P1		P2		P	23
PIN	FUNCTION	CONN TO	FUNCTION	CONN TO	FUNCTION	CONN TO
1	CH-9G	CMU-13	OLA-GRN	A123	2P-YEL	114
2	CH-9Y	CMU-16	OLA-YEL	A122	4P-YEL	105
3	CH-10G	CMU-R	OLB-GRN	A126	6P-YEL	120
4	CH-10Y	CMU-U	OLB-YEL	A125	8P-YEL	111

Do not provide the P20 terminal assembly (red monitor board) or red interface ribbon cable as specified in LA Specification No. 54-053-08.

Provide a P20 connector that mates with and is compatible with the red interface connector mounted on the front of the conflict monitor. Ensure that the P20 connector and the red interface

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connector on the conflict monitor are center polarized to ensure proper connection. Ensure that removal of the P20 connector will cause the conflict monitor to recognize a latching fault condition and place the cabinet into flashing operation.

Wire the P20 connector to the output file and auxiliary output file using 22 AWG stranded wires. Ensure the length of these wires is a minimum of 42 inches in length. Provide a durable braided sleeve around the wires to organize and protect the wires.

Wire the P20 connector to the traffic signal red displays to provide inputs to the conflict monitor as shown below. Ensure the pedestrian Don't Walk circuits are wired to channels 13 through 16 of the P20 connector. When no auxiliary output file is installed in the cabinet, provide wires for channels 9 through 12 reds. Provide a wire for special function 1. Terminate the unused wires with ring type lugs, insulated, and bundled for optional use.

	P20 Connector							
PIN	FUNCTION	CONN TO	PIN	FUNCTION	CONN TO			
1	Channel 15 Red	119	2	Channel 16 Red	110			
3	Channel 14 Red	104	4	Chassis GND	01-9			
5	Channel 13 Red	113	6	N/C				
7	Channel 12 Red	AUX 101	8	Spec Function 1				
9	Channel 10 Red	AUX 124	10	Channel 11 Red	AUX 114			
11	Channel 9 Red	AUX 121	12	Channel 8 Red	107			
13	Channel 7 Red	122	14	Channel 6 Red	134			
15	Channel 5 Red	131	16	Channel 4 Red	101			
17	Channel 3 Red	116	18	Channel 2 Red	128			
19	Channel 1 Red	125	20	Red Enable	01-14			

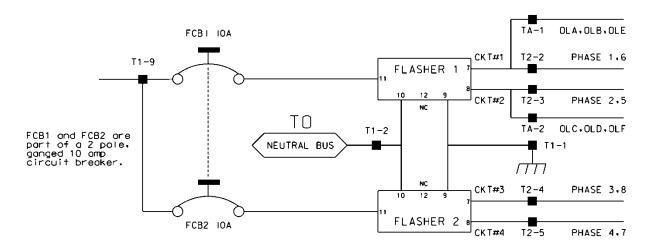
Ensure the controller unit outputs to the auxiliary output file are pre-wired to the C5 connector. When no auxiliary output file is installed in the cabinet, connect the C5 connector to a storage socket located on the Input Panel or on the rear of the PDA.

Do not wire pin 12 of the load switch sockets.

In addition to the requirements of LA Specification No. 54-053-08, ensure relay K1 on the Power Distribution Assembly (PDA) is a four pole relay and K2 on the PDA is a two pole relay.

Provide a two pole, ganged circuit breaker for the flash bus circuit. Ensure the flash bus circuit breaker is an inverse time circuit breaker rated for 10 amps at 120 VAC with a minimum of 10,000 RMS symmetrical amperes short circuit current rating. Do not provide the auxiliary switch feature on the flash bus circuit breaker. Ensure the ganged flash bus circuit breaker is certified by the circuit breaker manufacturer to provide gang tripping operation.

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Ensure auxiliary output files are wired as follows:

AUXILIARY OUTPUT FILE TERMINAL BLOCK TA ASSIGNMENTS					
POSITION FUNCTION					
1	Flasher Unit #1, Circuit 1/FTR1 (OLA, OLB)/FTR3 (OLE)				
2	Flasher Unit #1, Circuit 2/FTR2 (OLC, OLD)/FTR3 (OLF)				
3	Flash Transfer Relay Coils				
4	AC -				
5	Power Circuit 5				
6	Power Circuit 5				
7	Equipment Ground Bus				
8	NC				

Provide four spare load resistors mounted in each cabinet. Ensure each load resistor is rated as shown in the table below. Wire one side of each load resistor to AC-. Connect the other side of each resistor to a separate terminal on a four (4) position terminal block. Mount the load resistors and terminal block either inside the back of Output File No. 1 or on the upper area of the Service Panel.

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ACCEPTABLE LOAD RESISTOR VALUES				
VALUE (ohms) WATTAGE				
1.5K – 1.9 K	25W (min)			
2.0K – 3.0K	10W (min)			

Provide Model 200 load switches, Model 204 flashers, Model 242 DC isolators, Model 252 AC isolators, and Model 206L power supply units that conform to CALTRANS' "*Transportation Electrical Equipment Specifications*" dated March 12, 2009 with Erratum 1.

C. Type 170 E Cabinet Physical Requirements:

Do not mold, cast, or scribe the name "City of Los Angeles" on the outside of the cabinet door as specified in LA Specification No. 54-053-08. Do not provide a Communications Terminal Panel as specified in LA Specification No. 54-053-08. Do not provide terminal block TBB on the Service Panel. Do not provide Cabinet Verification Test Program software or associated test jigs as specified in LA Specification No. 54-053-08.

Furnish unpainted, natural, aluminum cabinet shells. Ensure that all non-aluminum hardware on the cabinet is stainless steel or a Department approved non-corrosive alternate.

Ensure the lifting eyes, gasket channels, police panel, and all supports welded to the enclosure and doors are fabricated from 0.125 inch minimum thickness aluminum sheet and meet the same standards as the cabinet and doors.

Provide front and rear doors with latching handles that allow padlocking in the closed position. Furnish 0.75 inch minimum diameter stainless steel handles with a minimum 0.5 inch shank. Place the padlocking attachment at 4.0 inches from the handle shank center to clear the lock and key. Provide an additional 4.0 inches minimum gripping length.

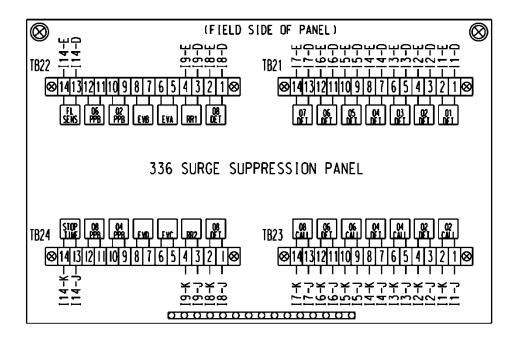
Provide Corbin #2 locks on the front and rear doors. Provide one (1) Corbin #2 and one (1) police master key with each cabinet. Ensure main door locks allow removal of keys in the locked position only.

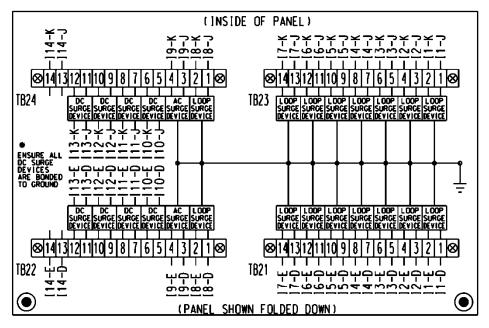
Provide a surge protection panel with 16 loop surge protection devices and designed to allow sufficient free space for wire connection/disconnection and surge protection device replacement. For model 332 cabinets, provide an additional 20 loop surge protection devices. Provide an additional two AC+ interconnect surge devices to protect one slot and eight DC surge protection devices to protect four slots. Provide no protection devices on slot I14.

For pole mounted cabinets, mount surge protection devices for the AC+ interconnect inputs, inductive loop detector inputs, and low voltage DC inputs on a swing down panel assembly fabricated from sturdy aluminum. Attach the swing down panel to the bottom rear cabinet rack assembly using thumb screws. Ensure the swing down panel allows for easy removal of the input file without removing the surge protection panel assembly or its parts. Have the surge protection devices mounted horizontally on the panel and soldered to the feed through terminals of four 14 position terminal blocks with #8 screws mounted on the other side. Ensure the top row of terminals is connected to the upper slots and the bottom row of terminals is connected to the bottom slots. Provide a 15 position copper equipment ground bus attached to the field terminal side (outside) of

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the swing down panel for termination of loop lead-in shield grounds. Ensure that a Number 4 AWG green wire connects the surge protection panel assembly ground bus to the main cabinet equipment ground.





For base mounted cabinets, mount surge protection panels on the left side of the cabinet as viewed from the rear. Attach each panel to the cabinet rack assembly using bolts and make it easily removable. Mount the surge protection devices in vertical rows on each panel and connect the

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devices to one side of 12 position, double row terminal blocks with #8 screws. For each surge protection panel, terminate all grounds from the surge protection devices on a copper equipment ground bus attached to the surge protection panel. Wire the terminals to the rear of a standard input file using spade lugs for input file protection.

Provide permanent labels that indicate the slot and the pins connected to each terminal that may be viewed from the rear cabinet door. Label and orient terminals so that each pair of inputs is next to each other. Indicate on the labeling the input file (I or J), the slot number (1-14) and the terminal pins of the input slots (either D & E for upper or J & K for lower).

Provide a minimum 14 x 16 inch pull out, hinged top shelf located immediately below controller mounting section of the cabinet. Ensure the shelf is designed to fully expose the table surface outside the controller at a height approximately even with the bottom of the controller. Ensure the shelf has a storage bin interior which is a minimum of 1 inch deep and approximately the same dimensions as the shelf. Provide an access to the storage area by lifting the hinged top of the shelf. Fabricate the shelf and slide from aluminum or stainless steel and ensure the assembly can support the 2070L controller plus 15 pounds of additional weight. Ensure shelf has a locking mechanism to secure it in the fully extended position and does not inhibit the removal of the 2070L controller or removal of cards inside the controller when fully extended. Provide a locking mechanism that is easily released when the shelf is to be returned to its non-use position directly under the controller.

D. Model 2018 Enhanced Conflict Monitor:

Furnish Model 2018 Enhanced Conflict Monitors that provide monitoring of 18 channels. Ensure each channel consists of a green, yellow, and red field signal input. Ensure that the conflict monitor meets or exceeds CALTRANS' Transportation Electrical Equipment Specifications dated March 12, 2009, with Erratum 1 (hereafter referred to as CALTRANS' 2009 TEES) for a model 210 monitor unit and other requirements stated in this specification.

Ensure the conflict monitor is provided with an 18 channel conflict programming card. Pin EE and Pin T of the conflict programming card shall be connected together. Pin 16 of the conflict programming card shall be floating. Ensure that the absence of the conflict programming card will cause the conflict monitor to trigger (enter into fault mode), and remain in the triggered state until the programming card is properly inserted and the conflict monitor is reset.

Provide a conflict monitor that incorporates LED indicators into the front panel to dynamically display the status of the monitor under normal conditions and to provide a comprehensive review of field inputs with monitor status under fault conditions. Ensure that the monitor indicates the channels that were active during a conflict condition and the channels that experienced a failure for all other per channel fault conditions detected. Ensure that these indications and the status of each channel are retained until the Conflict Monitor is reset. Furnish LED indicators for the following:

- AC Power (Green LED indicator)
- VDC Failed (Red LED indicator)
- WDT Error (Red LED indicator)
- Conflict (Red LED indicator)
- Red Fail (Red LED indicator)
- Dual Indication (Red LED indicator)

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- Yellow/Clearance Failure (Red LED indicator)
- PCA/PC Ajar (Red LED indicator)
- Monitor Fail/Diagnostic Failure (Red LED indicator)
- 54 Channel Status Indicators (1 Red, 1 Yellow, and 1 Green LED indicator for each of the 18 channels)

Provide a switch to set the Red Fail fault timing. Ensure that when the switch is in the ON position the Red Fail fault timing value is set to 1350 +/- 150 ms (2018 mode). Ensure that when the switch is in the OFF position the Red Fail fault timing value is set to 850 +/- 150 ms (210 mode).

Provide a switch to set the Watchdog fault timing. Ensure that when the switch is in the ON position the Watchdog fault timing value is set to 1.0 ± 0.1 s (2018 mode). Ensure that when the switch is in the OFF position the Watchdog fault timing value is set to 1.5 ± 0.1 s (210 mode).

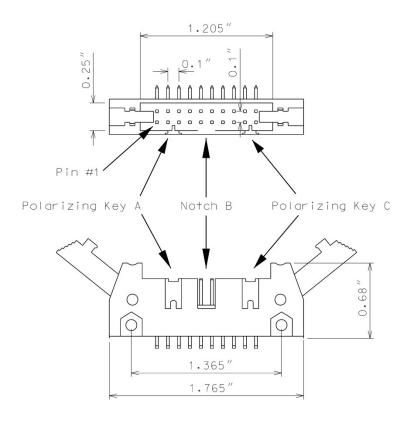
Provide a jumper or switch to set the AC line brown-out levels. Ensure that when the jumper is present or the switch is in the ON position the AC line dropout voltage threshold is 98 +/- 2 Vrms, the AC line restore voltage threshold is 103 +/- 2 Vrms, and the AC line brown-out timing value is set to 400 +/- 50ms (2018 mode). Ensure that when the jumper is not present or the switch is in the OFF position the AC line dropout voltage threshold is 92 +/- 2 Vrms, the AC line restore voltage threshold is 98 +/- 2 Vrms, and the AC line brown-out timing value is set to 80 +/- 17 ms (210 mode).

Provide a jumper or switch that will enable and disable the Watchdog Latch function. Ensure that when the jumper is not present or the switch is in the OFF position the Watchdog Latch function is disabled. In this mode of operation, a Watchdog fault will be reset following a power loss, brownout, or power interruption. Ensure that when the jumper is present or the switch is in the ON position the Watchdog Latch function is enabled. In this mode of operation, a Watchdog fault will be retained until a Reset command is issued.

Provide a jumper that will reverse the active polarity for pin #EE (output relay common). Ensure that when the jumper is not present pin #EE (output relay common) will be considered 'Active' at a voltage greater than 70 Vrms and 'Not Active' at a voltage less than 50 Vrms (Caltrans mode). Ensure that when the jumper is present pin #EE (output relay common) will be considered 'Active' at a voltage less than 50 Vrms and 'Not Active' at a voltage greater than 70 Vrms (Failsafe mode).

In addition to the connectors required by CALTRANS' 2009 TEES, provide the conflict monitor with a red interface connector mounted on the front of the monitor. Ensure the connector is a 20 pin, right angle, center polarized, male connector with latching clip locks and polarizing keys. Ensure the right angle solder tails are designed for a 0.062" thick printed circuit board. Keying of the connector shall be between pins 3 and 5, and between 17 and 19. Ensure the connector has two rows of pins with the odd numbered pins on one row and the even pins on the other row. Ensure the connector pin row spacing is 0.10" and pitch is 0.10". Ensure the mating length of the connector pins is 0.24". Ensure the pins are finished with gold plating 30μ " thick.

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Ensure the red interface connector pins on the monitor have the following functions:

Function	Pin #	Function
Channel 15 Red	2	Channel 16 Red
Channel 14 Red	4	Chassis Ground
Channel 13 Red	6	Special Function 2
Channel 12 Red	8	Special Function 1
Channel 10 Red	10	Channel 11 Red
Channel 9 Red	12	Channel 8 Red
Channel 7 Red	14	Channel 6 Red
Channel 5 Red	16	Channel 4 Red
Channel 3 Red	18	Channel 2 Red
Channel 1 Red	20	Red Enable
	Channel 15 Red Channel 14 Red Channel 13 Red Channel 12 Red Channel 10 Red Channel 9 Red Channel 7 Red Channel 5 Red Channel 3 Red	Channel 15 Red 2 Channel 14 Red 4 Channel 13 Red 6 Channel 12 Red 8 Channel 10 Red 10 Channel 9 Red 12 Channel 7 Red 14 Channel 5 Red 16 Channel 3 Red 18

Ensure that removal of the P20 cable connector will cause the conflict monitor to recognize a latching fault condition and place the cabinet into flashing operation.

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Provide Special Function 1 and Special Function 2 inputs to the unit which shall disable only Red Fail Monitoring when either input is sensed active. A Special Function input shall be sensed active when the input voltage exceeds 70 Vrms with a minimum duration of 550 ms. A Special Function input shall be sensed not active when the input voltage is less than 50 Vrms or the duration is less than 250 ms. A Special Function input is undefined by these specifications and may or may not be sensed active when the input voltage is between 50 Vrms and 70 Vrms or the duration is between 250 ms and 550 ms.

Ensure the conflict monitor recognizes field signal inputs for each channel that meet the following requirements:

- consider a Red input greater than 70 Vrms and with a duration of at least 500 ms as an "on" condition;
- consider a Red input less than 50 Vrms or with a duration of less than 200 ms as an "off" condition (no valid signal);
- consider a Red input between 50 Vrms and 70 Vrms or with a duration between 200 ms and 500 ms to be undefined by these specifications;
- consider a Green or Yellow input greater than 25 Vrms and with a duration of at least 500 ms as an "on" condition;
- consider a Green or Yellow input less than 15 Vrms or with a duration of less than 200 ms as an "off" condition; and
- consider a Green or Yellow input between 15 Vrms and 25 Vrms or with a duration between 200 ms and 500 ms to be undefined by these specifications.

Provide a conflict monitor that recognizes the faults specified by CALTRANS' 2009 TEES and the following additional faults. Ensure the conflict monitor will trigger upon detection of a fault and will remain in the triggered (in fault mode) state until the unit is reset at the front panel or through the external remote reset input for the following failures:

- 1. Red Monitoring or Absence of Any Indication (Red Failure): A condition in which no "on" voltage signal is detected on any of the green, yellow, or red inputs to a given monitor channel. If a signal is not detected on at least one input (R, Y, or G) of a conflict monitor channel for a period greater than 1000 ms when used with a 170 controller and 1500 ms when used with a 2070 controller, ensure monitor will trigger and put the intersection into flash. If the absence of any indication condition lasts less than 700 ms when used with a 170 controller and 1200 ms when used with a 2070 controller, ensure conflict monitor will not trigger. Red fail monitoring shall be enabled on a per channel basis by the use of switches located on the conflict monitor. Have red monitoring occur when all of the following input conditions are in effect:
 - a) Red Enable input to monitor is active (Red Enable voltages are "on" at greater than 70 Vrms, off at less than 50 Vrms, undefined between 50 and 70 Vrms), and
 - b) Neither Special Function 1 nor Special Function 2 inputs are active.

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- c) Pin #EE (output relay common) is not active
- 2. Short/Missing Yellow Indication Fault (Clearance Error): Yellow indication following a green is missing or shorter than 2.7 seconds (with ± 0.1-second accuracy). If a channel fails to detect an "on" signal at the Yellow input for a minimum of 2.7 seconds (± 0.1 second) following the detection of an "on" signal at a Green input for that channel, ensure that the monitor triggers and generates a clearance/short yellow error fault indication. Short/missing yellow (clearance) monitoring shall be enabled on a per channel basis by the use of switches located on the conflict monitor. This fault shall not occur when the channel is programmed for Yellow Inhibit, when the Red Enable signal is inactive or pin #EE (output relay common) is active.
- 3. **Dual Indications on the Same Channel:** In this condition, more than one indication (R,Y,G) is detected as "on" at the same time on the same channel. If dual indications are detected for a period greater than 500 ms, ensure that the conflict monitor triggers and displays the proper failure indication (Dual Ind fault). If this condition is detected for less than 200 ms, ensure that the monitor does not trigger. G-Y-R dual indication monitoring shall be enabled on a per channel basis by the use of switches located on the conflict monitor. G-Y dual indication monitoring shall be enabled for all channels by use of a switch located on the conflict monitor. This fault shall not occur when the Red Enable signal is inactive or pin #EE (output relay common) is active.
- 4. **Configuration Settings Change:** The configuration settings are comprised of (as a minimum) the permissive diode matrix, dual indication switches, yellow disable jumpers, any option switches, any option jumpers, and the Watchdog Enable switch. Ensure the conflict monitor compares the current configuration settings with the previous stored configuration settings on power-up, on reset, and periodically during operation. If any of the configuration settings are changed, ensure that the conflict monitor triggers and causes the program card indicator to flash. Ensure that configuration change faults are only reset by depressing and holding the front panel reset button for a minimum of three seconds. Ensure the external remote reset input does not reset configuration change faults.

Ensure the conflict monitor will trigger and the AC Power indicator will flash at a rate of 2 Hz \pm 20% with a 50% duty cycle when the AC Line voltage falls below the "drop-out" level. Ensure the conflict monitor will resume normal operation when the AC Line voltage returns above the "restore" level. Ensure the AC Power indicator will remain illuminated when the AC voltage returns above the "restore" level. Should an AC Line power interruption occur while the monitor is in the fault mode, then upon restoration of AC Line power, the monitor will remain in the fault mode and the correct fault and channel indicators will be displayed.

Provide a flash interval of at least 6 seconds and at most 10 seconds in duration following a power-up, an AC Line interruption, or a brownout restore. Ensure the conflict monitor will suspend all fault monitoring functions, close the Output relay contacts, and flash the AC indicator at a rate of $4 \text{ Hz} \pm 20\%$ with a 50% duty cycle during this interval. Ensure the termination of the flash interval after at least 6 seconds if the Watchdog input has made 5 transitions between the True and False state and the AC Line voltage is greater than the "restore" level. If the watchdog input has not made

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5 transitions between the True and False state within 10 ± 0.5 seconds, the monitor shall enter a WDT error fault condition.

Ensure the conflict monitor will monitor an intersection with a minimum of four approaches using the four-section Flashing Yellow Arrow (FYA) vehicle traffic signal as outlined by the NCHRP 3-54 research project for protected-permissive left turn signal displays. Ensure the conflict monitor will operate in the FYA mode and FYAc (Compact) mode as specified below to monitor each channel pair for the following fault conditions: Conflict, Flash Rate Detection, Red Fail, Dual Indication, and Clearance. Provide a switch to select between the FYA mode and FYAc mode. Provide a switch to select each FYA phase movement for monitoring.

FYA mode

FYA Signal Head	Phase 1	Phase 3	Phase 5	Phase 7
Red Arrow	Channel 9 Red	Channel 10 Red	Channel 11 Red	Channel 12 Red
Yellow Arrow	Channel 9 Yellow	Channel 10 Yellow	Channel 11 Yellow	Channel 12 Yellow
Flashing Yellow Arrow	Channel 9 Green	Channel 10 Green	Channel 11 Green	Channel 12 Green
Green Arrow	Channel 1 Green	Channel 3 Green	Channel 5 Green	Channel 7 Green

FYAc mode

FYA Signal Head	Phase 1	Phase 3	Phase 5	Phase 7
Red Arrow	Channel 1 Red	Channel 3 Red	Channel 5 Red	Channel 7 Red
Yellow Arrow	Channel 1 Yellow	Channel 3 Yellow	Channel 5 Yellow	Channel 7 Yellow
Flashing Yellow Arrow	Channel 1 Green	Channel 3 Green	Channel 5 Green	Channel 7 Green
Green Arrow	Channel 9 Green	Channel 9 Yellow	Channel 10 Green	Channel 10 Yellow

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If a FYA channel pair is enabled for FYA operation, the conflict monitor will monitor the FYA logical channel pair for the additional following conditions:

- 1. **Conflict:** Channel conflicts are detected based on the permissive programming jumpers on the program card. This operation remains unchanged from normal operation except for the solid Yellow arrow (FYA clearance) signal.
- 2. Yellow Change Interval Conflict: During the Yellow change interval of the Permissive Turn channel (flashing Yellow arrow) the conflict monitor shall verify that no conflicting channels to the solid Yellow arrow channel (clearance) are active. These conflicting channels shall be determined by the program card compatibility programming of the Permissive Turn channel (flashing Yellow arrow). During the Yellow change interval of the Protected Turn channel (solid Green arrow) the conflict monitor shall verify that no conflicting channels to the solid Yellow arrow channel (clearance) are active as determined by the program card compatibility programming of the Protected Turn channel (solid Green arrow).
- 3. Flash Rate Detection: The conflict monitor unit shall monitor for the absence of a valid flash rate for the Permissive turn channel (flashing Yellow arrow). If the Permissive turn channel (flashing Yellow arrow) is active for a period greater than 1600 milliseconds, ensure the conflict monitor triggers and puts the intersection into flash. If the Permissive turn channel (flashing Yellow arrow) is active for a period less than 1400 milliseconds, ensure the conflict monitor does not trigger. Ensure the conflict monitor will remain in the triggered (in fault mode) state until the unit is reset at the front panel or through the external remote reset input. Provide a jumper or switch that will enable and disable the Flash Rate Detection function. Ensure that when the jumper is not present or the switch is in the OFF position the Flash Rate Detection function is enabled. Ensure that when the jumper is present or the switch is in the ON position the Flash Rate Detection function is disabled.
- 4. **Red Monitoring or Absence of Any Indication (Red Failure):** The conflict monitor unit shall detect a red failure if there is an absence of voltage on all four of the inputs of a FYA channel pair (RA, YA, FYA, GA).
- 5. **Dual Indications on the Same Channel:** The conflict monitor unit shall detect a dual indication if two or more inputs of a FYA channel pair (RA, YA, FYA, GA) are "on" at the same time.
- 6. **Short/Missing Yellow Indication Fault (Clearance Error):** The conflict monitor unit shall monitor the solid Yellow arrow for a clearance fault when terminating both the Protected Turn channel (solid Green arrow) interval and the Permissive Turn channel (flashing Yellow arrow) interval.

Ensure that the conflict monitor will log at least nine of the most recent events detected by the monitor in non-volatile EEPROM memory (or equivalent). For each event, record at a minimum the time, date, type of event, status of each field signal indication with RMS voltage, and specific channels involved with the event. Ensure the conflict monitor will log the following events: monitor reset, configuration, previous fault, and AC line. Furnish the signal sequence log that shows all channel states (Greens, Yellows, and Reds) and the Red Enable State for a minimum of 2 seconds prior to the current fault trigger point. Ensure the display resolution of the inputs for the signal sequence log is not greater than 50 ms.

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For conflict monitors used within an Ethernet communications system, provide a conflict monitor with an Ethernet 10/100 Mbps, RJ-45 port for data communication access to the monitor by a local notebook computer and remotely via a workstation or notebook computer device connected to the signal system local area network. The Ethernet port shall be electrically isolated from the conflict monitor's electronics and shall provide a minimum of 1500 Vrms isolation. Integrate monitor with Ethernet network in cabinet. Provide software to retrieve the time and date from a network server in order to synchronize the on-board times between the conflict monitor and the controller. Furnish and install the following Windows based, graphic user interface software on workstations and notebook computers where the signal system client software is installed: 1) software to view and retrieve all event log information, 2) software that will search and display a list of conflict monitor IP addresses and IDs on the network, and 3) software to change the conflict monitor's network parameters such as IP address and subnet mask.

For non-Ethernet connected monitors, provide a RS-232C/D compliant port (DB-9 female connector) on the front panel of the conflict monitor in order to provide communications from the conflict monitor to the 170/2070 controller or to a Department-furnished laptop computer. Electrically isolate the port interface electronics from all monitor electronics, excluding Chassis Ground. Ensure that the controller can receive all event log information through a controller Asynchronous Communications Interface Adapter (Type 170E) or Async Serial Comm Module (2070). Furnish and connect a serial cable from the conflict monitor's DB-9 connector to Comm Port 1 of the 2070 controller. Ensure conflict monitor communicates with the controller. Provide a Windows based graphic user interface software to communicate directly through the same monitor RS-232C/D compliant port to retrieve and view all event log information to a Department-furnished laptop computer. The RS-232C/D compliant port on the monitor shall allow the monitor to function as a DCE device with pin connections as follows:

Conflict Monitor RS-232C/D (DB-9 Female) Pinout				
Pin Number	Function	I/O		
1	DCD	0		
2	TX Data	0		
3	RX Data	I		
4	DTR	I		
5	Ground	-		
6	DSR	О		
7	CTS	I		
8	RTS	О		
9	NC	-		

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MONITOR BOARD EDGE CONNECTOR

Pin #	Function (Back Side)	Pin #	Function (Component
			Side)
1	Channel 2 Green	A	Channel 2 Yellow
2	Channel 13 Green	В	Channel 6 Green
3	Channel 6 Yellow	C	Channel 15 Green
4	Channel 4 Green	D	Channel 4 Yellow
5	Channel 14 Green	E	Channel 8 Green
6	Channel 8 Yellow	F	Channel 16 Green
7	Channel 5 Green	Н	Channel 5 Yellow
8	Channel 13 Yellow	J	Channel 1 Green
9	Channel 1 Yellow	K	Channel 15 Yellow
10	Channel 7 Green	L	Channel 7 Yellow
11	Channel 14 Yellow	M	Channel 3 Green
12	Channel 3 Yellow	N	Channel 16 Yellow
13	Channel 9 Green	P	Channel 17 Yellow
14	Channel 17 Green	R	Channel 10 Green
15	Channel 11 Yellow	S	Channel 11 Green
16	Channel 9 Yellow	T	Channel 18 Yellow
17	Channel 18 Green	U	Channel 10 Yellow
18	Channel 12 Yellow	V	Channel 12 Green
19	Channel 17 Red	\mathbf{W}	Channel 18 Red
20	Chassis Ground	X	Not Assigned
21	AC-	Y	DC Common
22	Watchdog Timer	Z	External Test Reset
23	+24VDC	AA	+24VDC
24	Tied to Pin 25	BB	Stop Time (Output)
25	Tied to Pin 24	CC	Not Assigned
26	Not Assigned	DD	Not Assigned
27	Relay Output, Side #3, N.O.	EE	Relay Output,Side
			#2,Common
28	Relay Output, Side #1, N.C.	FF	AC+

⁻⁻ Slotted for keying between Pins 17/U and 18/V

27

28

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CONFLICT PROGRAM CARD PIN ASSIGNMENTS Pin# Pin # **Function (Back Side) Function (Component** Side) 1 Channel 2 Green Channel 1 Green A 2 Channel 3 Green В Channel 2 Green 3 Channel 4 Green C Channel 3 Green 4 Channel 5 Green D Channel 4 Green 5 Channel 6 Green Е Channel 5 Green 6 F Channel 7 Green Channel 6 Green 7 Channel 8 Green Η Channel 7 Green 8 Channel 9 Green J Channel 8 Green Channel 9 Green 9 Channel 10 Green K 10 Channel 11 Green L Channel 10 Green 11 Channel 12 Green M Channel 11 Green 12 Channel 13 Green N Channel 12 Green 13 Channel 14 Green P Channel 13 Green 14 Channel 15 Green R Channel 14 Green 15 Channel 16 Green S Channel 15 Green 16 N/C Т PC AJAR U 17 Channel 1 Yellow Channel 9 Yellow V 18 Channel 2 Yellow Channel 10 Yellow 19 Channel 3 Yellow W Channel 11 Yellow 20 Channel 4 Yellow X Channel 12 Yellow 21 Channel 5 Yellow Y Channel 13 Yellow 22 Channel 6 Yellow Z Channel 14 Yellow 23 Channel 7 Yellow Channel 15 Yellow AA Channel 8 Yellow Channel 16 Yellow 24 BB25 Channel 17 Green CC Channel 17 Yellow Channel 18 Green 26 Channel 18 Yellow DD

EE

FF

PC AJAR (Program Card)

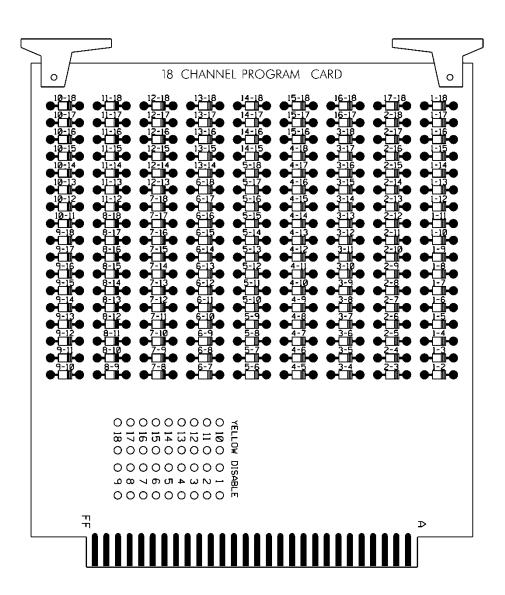
Channel 17 Green

Channel 16 Green

Yellow Inhibit Common

⁻⁻ Slotted for keying between Pins 24/BB and 25/CC

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E. Preemption and Sign Control Box

Provide preemption and sign control box to operate in a Model 332 and Model 336S cabinet. Provide hardware to mount the box to the cage of the cabinet to ensure the front side is facing the opposite side of the cabinet. Furnish the material of the box from a durable finished metallic or thermoplastic case. Ensure the size of the box is not greater than $7(l) \times 5(w) \times 5(d)$ inches. Ensure that no modification is necessary to mount the box on the cabinet cage.

Provide the following components in the preemption and sign control box: relays, fuses, terminal blocks, MOVs, resistor, RC network, lamp, and push button switch.

Provide UL Listed or Recognized relay K1 as a DPDT enclosed relay (120 VAC, 60 Hz coil) with an 8-pin octal-style plug and associated octal base. Provide contact material made of AgCdO with a 10 amp, 240 VAC rating. Ensure the relay has a specified pickup voltage of 102 VAC.

Provide relay SSR1 as a Triac SPST normally open solid state relay that is rated for 120 VAC input and zero-crossing (resistive load) 25 amp @ 120 VAC output. Ensure the relay turns on at 90 Vrms within 10 ms and turns off at 10 Vrms within 40 ms. Ensure the relay has physical

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characteristics as shown in the wiring detail in Figure 1. Provide 4 terminal screws with saddle clamps.

Provide fuses F1 and F2 as a UL Listed ¼" x 1-1/4" glass tube rated at 250 volts with a 10kA interrupting rating. Ensure F1 non-delay (fast-acting) and F2 slow-blow (time-delay) fuses have a maximum opening times of 60 minutes and 120 seconds for currents of 135 and 200 percent of the ampere rating, respectively. Ensure F2 slow-blow (time-delay) fuses have a minimum opening times of 12 seconds at 200 percent of the ampere rating. Provide fuse holders that are UL Recognized panel-mounted holders rated 250V, 15 ampere minimum with bayonet-type knobs which accept ¼" x 1-1/4" glass tube fuses.

Provide terminal blocks that are rated for 300V and are made of electrical grade thermoplastic or thermosetting plastic. Ensure each terminal block is of closed back design and has recessed-screw terminals with molded barriers between terminals. Ensure each terminal block is labeled with a block designation. Ensure each terminal is labeled with the function and a number.

Provide 3/4-inch diameter radial lead UL-recognized metal oxide varistors (MOVs) that have electrical performance as outlined below.

PROPERTIES OF MOV SURGE PROTECTOR					
Maximum Continuous Applied Voltage at	150 VAC (RMS)				
185° F	200 VDC				
Maximum Peak 8x20µs Current at 185° F	6500 A				
Maximum Energy Rating at 185° F	80 J				
Voltage Range 1 mA DC Test at 77° F	212-268 V				
Max. Clamping Voltage 8x20µs, 100A at 77° F	395 V				
Typical Capacitance (1 MHz) at 77° F	1600 pF				

Provide resistor R1 as a 2K ohm, 12 watt, wirewound resistor with tinned terminals and attaching leads. Ensure the resistor is spaced apart from surrounding wires.

Provide a LED or incandescent lamp that has a voltage rating of 120 VAC with a minimum life rating at 50,000 hours.

Wire the preemption and sign control box as shown in Figure 1.

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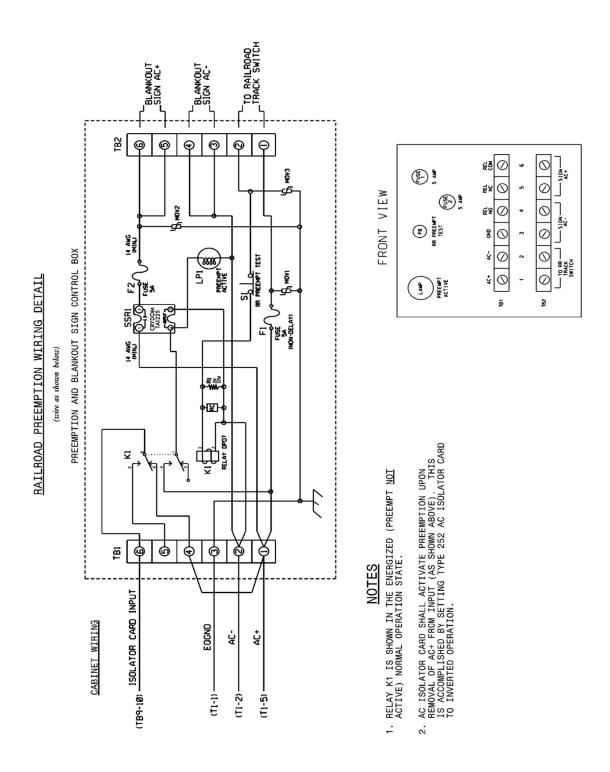


Figure 1

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3.3. MATERIALS – TYPE 170 DETECTOR SENSOR UNITS

Furnish detector sensor units that comply with Chapter 5 Section 1, "General Requirements," and Chapter 5 Section 2, "Model 222 & 224 Loop Detector Sensor Unit Requirements," of the CALTRANS "Transportation Electrical Equipment Specifications" dated March 12, 2009 with Erratum 1.

3.4. MATERIALS – TYPE 2070E CONTROLLERS

Furnish model 2070E controller units that conform to CALTRANS *Transportation Electrical Equipment Specifications* (TEES) (dated March 12, 2009, plus Errata 1 dated January 21, 2010 and Errata 2 dated December 5, 2014) except as required herein.

The Department will provide software at the beginning of the burning-in period. Contractor shall give 5 working days notice before needing software. Program software provided by the Department.

Provide model 2070E controllers with OS-9 release 1.3.1 or later with kernel edition #380 or later operating software and device drivers, composed of the unit chassis and at a minimum the following modules and assemblies:

- MODEL 2070-1E, CPU Module, Single Board, with 8Mb Datakey (blue in color)
- MODEL 2070-2E+, Field I/O Module (FI/O)
 - Note: Configure the Field I/O Module to disable both the External WDT Shunt/Toggle Switch and SP3 (SP3 active indicator is "off")
- MODEL 2070-3B, Front Panel Module (FP), Display B (8x40)
- MODEL 2070-4A, Power Supply Module, 10 AMP
- MODEL 2070-7A, Async Serial Com Module (9-pin RS-232)

T-1

I − I Feb 07, 2018 2:20 pm ITEMIZED PROPOSAL FOR CONTRACT NO. DN00563						Page 1 of 6
	ty: Henderson					_
Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
		F	ROADWAY ITEMS			
0001	0000100000-N	800	MOBILIZATION	Lump Sum	L.S.	
0002	0000400000-N	801	CONSTRUCTION SURVEYING	Lump Sum	L.S.	
0003	0022000000-E	225	UNCLASSIFIED EXCAVATION	2,500		
0004	0050000000-Е	226	SUPPLEMENTARY CLEARING & GRUB- BING	CY 1 1 ACR		
0005	0063000000-N	SP	GRADING	Lump Sum	L.S.	
0006	0196000000-E	270	GEOTEXTILE FOR SOIL STABILIZA- TION	1,000 SY		
0007	0318000000-E	300	FOUNDATION CONDITIONING MATE- RIAL, MINOR STRUCTURES	40 TON		
0008	0320000000-E	300	FOUNDATION CONDITIONING GEO- TEXTILE	120 SY		
0009	0343000000-E	310	15" SIDE DRAIN PIPE	20 LF		
0010	0366000000-E	310	15" RC PIPE CULVERTS, CLASS III	176 LF		
0011	0372000000-E	310	18" RC PIPE CULVERTS, CLASS III	116 LF		
0012	0600000000-E	310	30" CS PIPE CULVERTS, 0.079" THICK	32 LF		
0013	0995000000-E	340	PIPE REMOVAL	345 LF		
0014	1099500000-E	505	SHALLOW UNDERCUT	625 CY		
0015	1099700000-E	505	CLASS IV SUBGRADE STABILIZA- TION	1,250 TON		
0016	1220000000-E		INCIDENTAL STONE BASE	250 TON		
0017	1308000000-E	607	MILLING ASPHALT PAVEMENT, ***" TO *****" (0 TO 3)	7,910 SY		

1,200

SY

607 INCIDENTAL MILLING

0018 1330000000-E

ITEMIZED PROPOSAL FOR CONTRACT NO. DN00563 Feb 07, 2018 2:20 pm

County: Henderson

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0019	1489000000-E	610	ASPHALT CONC BASE COURSE, TYPE B25.0B	830 TON		
0020	1498000000-E	610	ASPHALT CONC INTERMEDIATE COURSE, TYPE I19.0B	1,080 TON		
0021	1519000000-E	610	ASPHALT CONC SURFACE COURSE, TYPE S9.5B	1,450 TON		
0022	1575000000-E	620	ASPHALT BINDER FOR PLANT MIX	180 TON		
0023	1693000000-E	654	ASPHALT PLANT MIX, PAVEMENT REPAIR	100 TON		
0024	2220000000-E	838	REINFORCED ENDWALLS	2 CY		
0025	2253000000-E	840	PIPE COLLARS	0.656 CY		
0026	2286000000-N	840	MASONRY DRAINAGE STRUCTURES	2 EA		
0027	2308000000-E	840	MASONRY DRAINAGE STRUCTURES	2 LF		
0028	2374000000-N	840	FRAME WITH GRATE & HOOD, STD 840.03, TYPE ** (TYPE E)	1 EA		
0029	2396000000-N	840	FRAME WITH COVER, STD 840.54	1 EA		
0030	2549000000-E	846	2'-6" CONCRETE CURB & GUTTER	270 LF		
0031	2591000000-E	848	4" CONCRETE SIDEWALK	450 SY		
0032	2605000000-N	848	CONCRETE CURB RAMPS	10 EA		
0033	2830000000-N	858	ADJUSTMENT OF MANHOLES	1 EA		
0034	2845000000-N	858	ADJUSTMENT OF METER BOXES OR VALVE BOXES	5 EA		
0035	3030000000-Е	862	STEEL BEAM GUARDRAIL	825 LF		
0036	3045000000-Е	862	STEEL BEAM GUARDRAIL, SHOP CURVED	50 LF		
0037	3150000000-N	862	ADDITIONAL GUARDRAIL POSTS	5 EA		

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ITEMIZED PROPOSAL FOR CONTRACT NO. DN00563

County: Henderson Line Item Number Sec Description Quantity **Unit Cost** Amount 0038 3195000000-N 862 GUARDRAIL END UNITS, TYPE AT-1 1 EΑ SP **GUARDRAIL END UNITS, TYPE TL-3** 5 0039 3287000000-N EΑ **GUARDRAIL ANCHOR UNITS, TYPE** 4 0040 3317000000-N B-77 EΑ 0041 3360000000-E 863 REMOVE EXISTING GUARDRAIL 1,700 LF 0042 3649000000-E 876 RIP RAP, CLASS B 10 TON 0043 3656000000-E GEOTEXTILE FOR DRAINAGE 315 SY 903 SUPPORTS, 3-LB STEEL U-CHANNEL 0044 4072000000-E 380 LF 904 SIGN ERECTION, TYPE D 0045 4096000000-N 1 EΑ 0046 4102000000-N 904 SIGN ERECTION, TYPE E 23 EΑ 904 SIGN ERECTION, TYPE F 2 0047 4108000000-N EΑ 0048 4155000000-N DISPOSAL OF SIGN SYSTEM, U-22 CHANNEL EΑ 1110 WORK ZONE SIGNS (STATIONARY) 199 0049 4400000000-E SF 1110 WORK ZONE SIGNS (BARRICADE 0050 4410000000-E 88 MOUNTED) SF 0051 4430000000-N 1130 DRUMS 77 EΑ 0052 4445000000-E 1145 BARRICADES (TYPE III) 64 LF 0053 4455000000-N 1150 FLAGGER 224 DAY 1251 TEMPORARY RAISED PAVEMENT 0054 4650000000-N 36 **MARKERS** EΑ 0055 4685000000-E 1205 THERMOPLASTIC PAVEMENT MARKING 8,382 LINES (4", 90 MILS) LF 1205 THERMOPLASTIC PAVEMENT MARKING 0056 4686000000-E 8,217 LINES (4", 120 MILS) LF

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Line Item Number Sec Description Quantity **Unit Cost** Amount 0057 4695000000-E 1205 THERMOPLASTIC PAVEMENT MARKING 135 LINES (8", 90 MILS) LF 1205 THERMOPLASTIC PAVEMENT MARKING 80 0058 4705000000-E LINES (16", 120 MILS) LF THERMOPLASTIC PAVEMENT MARKING 0059 4710000000-E 1205 200 LINES (24", 120 MILS) LF 1205 THERMOPLASTIC PAVEMENT MARKING 0060 4721000000-E 18 CHARACTER (120 MILS) EΑ 1205 THERMOPLASTIC PAVEMENT MARKING 0061 4725000000-E 18 SYMBOL (90 MILS) EΑ 0062 4810000000-E 1205 PAINT PAVEMENT MARKING LINES 22,639 (4")LF 0063 4820000000-E 1205 PAINT PAVEMENT MARKING LINES 540 LF 0064 4830000000-E 1205 PAINT PAVEMENT MARKING LINES 60 (16")LF 0065 4835000000-E 1205 PAINT PAVEMENT MARKING LINES 540 (24")LF 1205 PAINT PAVEMENT MARKING CHARAC-0066 4840000000-N 12 TFR EΑ 1253 SNOWPLOWABLE PAVEMENT MARKERS 0067 4905000000-N 63 EΑ 0068 5672000000-N 1515 RELOCATE FIRE HYDRANT 1 EΑ 1605 TEMPORARY SILT FENCE 0069 6000000000-E 4,920 LF 1610 STONE FOR EROSION CONTROL, 90 0070 6006000000-E CLASS A TON 1610 STONE FOR EROSION CONTROL, 975 0071 6009000000-E CLASS B TON 0072 6012000000-E 1610 SEDIMENT CONTROL STONE 445 TON 1615 TEMPORARY MULCHING 1.5 0073 6015000000-E **ACR** 1620 SEED FOR TEMPORARY SEEDING 100 0074 6018000000-Е LB

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Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amount
0075	6021000000-E	1620	FERTILIZER FOR TEMPORARY SEED-ING	0.5 TON		
0076	6024000000-E	1622	TEMPORARY SLOPE DRAINS	200 LF		
0077	6029000000-E	SP	SAFETY FENCE	200 LF		
0078	6030000000-Е	1630	SILT EXCAVATION	2,300 CY		
0079	6036000000-E	1631	MATTING FOR EROSION CONTROL	4,190 SY		
0800	6037000000-E	SP	COIR FIBER MAT	100 SY		
0081	6042000000-Е	1632	1/4" HARDWARE CLOTH	450 LF		
0082	6071020000-Е	SP	POLYACRYLAMIDE (PAM)	30 LB		
0083	6084000000-Е	1660	SEEDING & MULCHING	3 ACR		
0084	6087000000-E	1660	MOWING	3 ACR		
0085	6090000000-E	1661	SEED FOR REPAIR SEEDING	50 LB		
0086	6093000000-E	1661	FERTILIZER FOR REPAIR SEEDING	0.25 TON		
0087	6096000000-E	1662	SEED FOR SUPPLEMENTAL SEEDING	50 LB		
0088	6108000000-E	1665	FERTILIZER TOPDRESSING	1 TON		
0089	6114500000-N	1667	SPECIALIZED HAND MOWING	10 MHR		
0090	6117000000-N	SP	RESPONSE FOR EROSION CONTROL	25 EA		
0091	6117500000-N		CONCRETE WASHOUT STRUCTURE	2 EA		
0092	7048500000-E	1705	PEDESTRIAN SIGNAL HEAD (16", 1 SECTION W/COUNTDOWN)	1 EA		
0093	7060000000-E	1705	SIGNAL CABLE	140 LF		
0094	7300000000-E	1715	UNPAVED TRENCHING (*********) (-1) (2")	55 LF		

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County: Henderson

1420/Feb07/Q80469.906/D433132420000/E105

Line #	Item Number	Sec #	Description	Quantity	Unit Cost	Amoun
0095	730000000-Е	1715	UNPAVED TRENCHING (********) (-1) (4")	15 LF		
0096	7300000000-E	1715	UNPAVED TRENCHING (********) (-2) (2")	15 LF		
0097	7324000000-N	1716	JUNCTION BOX (STANDARD SIZE)	1 1 EA		
0098	7444000000-E	1725	INDUCTIVE LOOP SAWCUT	315 LF		
0099	7456000000-E	1726	LEAD-IN CABLE (************) (14-2)	860 LF		
0100	7636000000-N	1745	SIGN FOR SIGNALS	1 1 EA		
0101	7642200000-N	1743	TYPE II PEDESTAL WITH FOUND- ATION	1 EA		
0102	7675000000-N	1747	LED BLANKOUT SIGN	1 EA		
0103	7696000000-N	1751	CONTROLLERS WITH CABINET (************************************	1 EA		
0104	7708000000-N	1751	DETECTOR CARD (************) (TYPE 170)	8 EA		
0105	7901000000-N	1753	CABINET BASE EXTENDER	1 1 EA		

Total Amount Of Bid For Entire Project :